NOVEMBER
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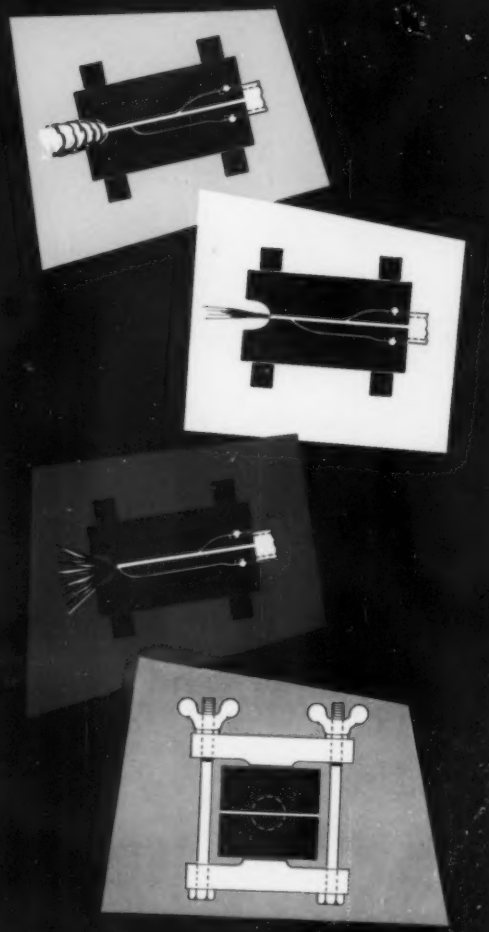
FOUNDRY

A PENTON PUBLICATION



Gating of Aluminum Diecastings

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Page 114

New Ferrocarbo Briquettes are the only cupola deoxidizers containing an expanding agent, a catalyst and a slag activator. Ferrocarbo Briquettes enable progressive foundrymen to obtain castings that are stronger, denser and more easily machinable. In addition, the use of Ferrocarbo® promotes more thorough deoxidation, improved fluidity, greater silicon efficiency, reduced sulfur, better manganese recovery, fewer scrapped castings.

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Ferrocarbo® distributors are Kerchner, Marshall & Company; Pittsburgh, Buffalo, Cleveland, Detroit, Philadelphia, Birmingham, Los Angeles, Canada.
Miller and Company; Chicago, St. Louis, Cincinnati, Kansas City, Mo., Burlington, Iowa.

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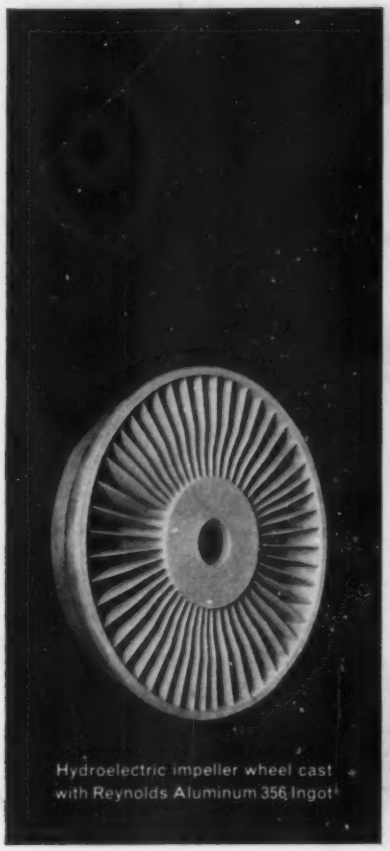
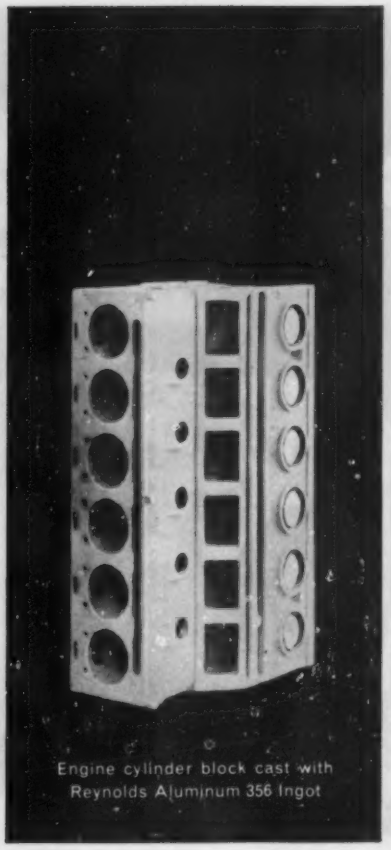
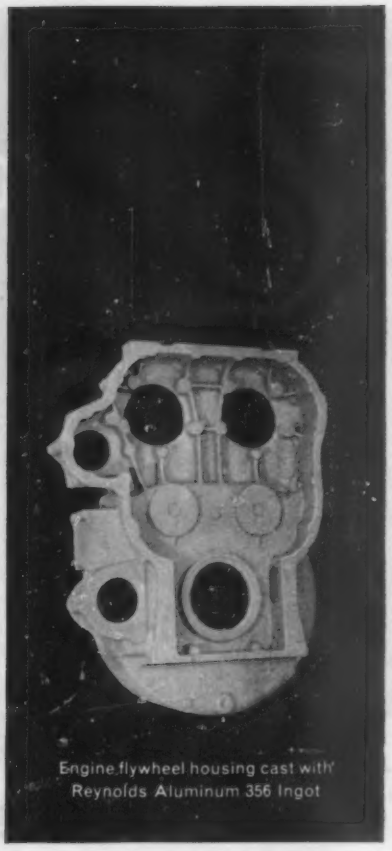


Hydroelectric impeller wheel cast with Reynolds Aluminum 356 Ingot



Engine cylinder block cast with Reynolds Aluminum 356 Ingot



Engine flywheel housing cast with Reynolds Aluminum 356 Ingot

Why Quality Aluminum Casting Company makes precision castings with Reynolds Aluminum 356 Ingot

Quality Aluminum Casting Company of Waukesha, Wisconsin has built a reputation based on their name—and they've done it over a forty year period by offering fine precision castings. Their metal: quality aluminum alloy ingot—Reynolds 356 Ingot.

Reynolds 356 Ingot is made from 100% virgin aluminum and top quality alloying elements. Impurities are held to an absolute minimum, far below published specifications. This control of the impurities is one of the reasons that our customers consistently report remarkable mechanical properties, far above standard in many cases. Each furnace charge is thoroughly cleaned, tested for correct chemical content, freedom from gas and oxides, grain-refined by addition of titanium and boron and then cast by Reynolds own "quick-chill" process.

Commercially acceptable 356 alloy can be made with a lot less fuss and bother but we think it is worth-while (and our customers whole-heartedly concur) to spend the extra time and effort to make each cast a metallurgical masterpiece.

When normally controlled foundry practices are used with Reynolds Casting Ingot, each and every part made will meet or exceed your highest expectations.

For more information on Reynolds Aluminum alloy ingot and your free copy of the new Reynolds manual, "Casting Aluminum", write to the *Reynolds Metals Company, P. O. Box 2346-FK, Richmond 18, Virginia.*

REYNOLDS ALUMINUM

Watch Reynolds new TV show "Harrigan & Son", Fridays; also "All Star Golf", Saturdays—ABC-TV

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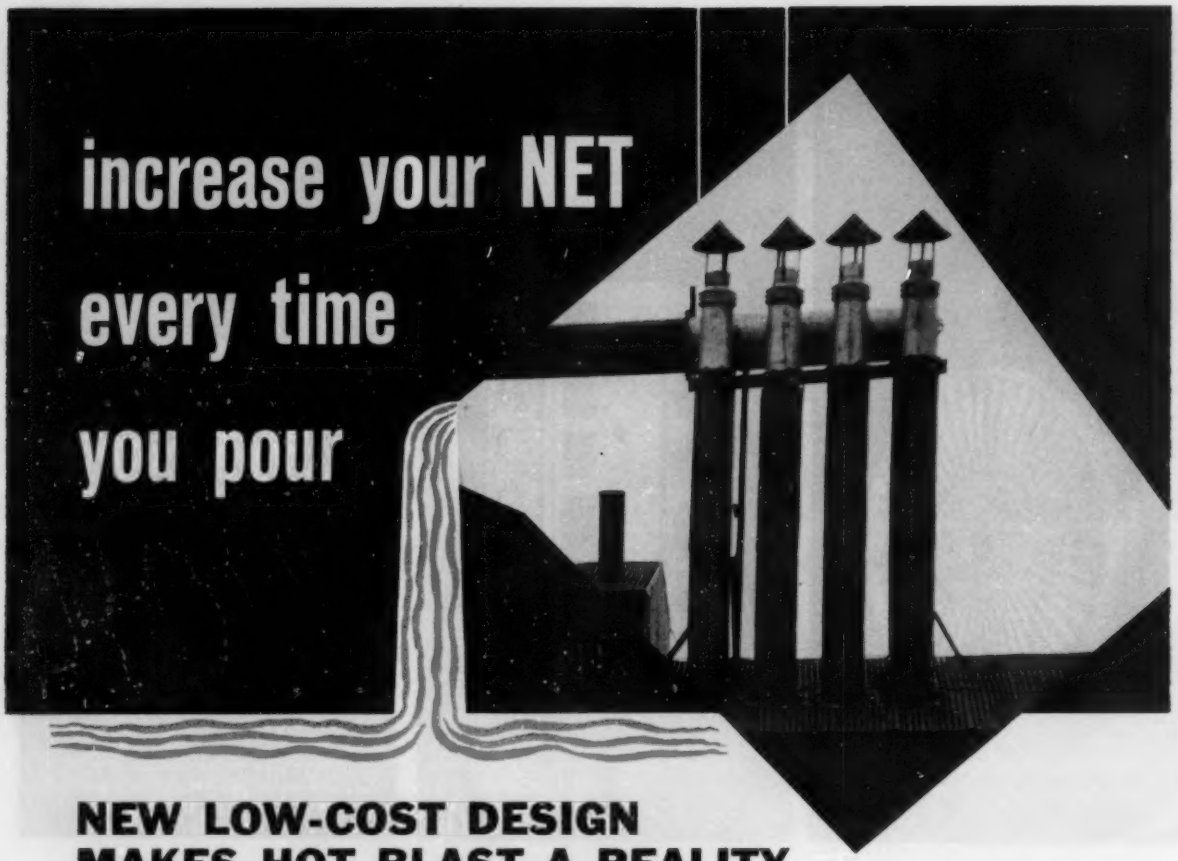

NEW LOW-COST DESIGN MAKES HOT BLAST A REALITY FOR SMALLER FOUNDRIES

Foundry executives operating Brown Hot Blast Air Preheaters in connection with their cupolas report savings that are unequalled by any other capital improvement. One foundry increased their net profits by $30,800 . . . another lowered costs $3.50 per ton of castings produced. Such savings are possible—with foundries small and large—because Brown Hot Blast reduces the pounds of coke, stone, alloys, and metallic loss while permitting greater use of steel and cast scrap. Let us show you how to increase your net profit. Write for your free Hot Blast Survey Form today!

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Address_____

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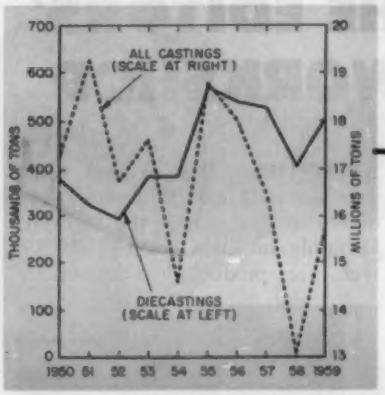

During the last ten years, the upward trend in production of nonferrous diecastings has outdistanced that for all types of castings, as indicated here. Diecasting shipments so far this year also have held up better than those of other types compared with 1959.

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FOUNDRY
A PENTON PUBLICATION

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Breakability of Knock-Off Risers 92
A knock-off core should be as thick as possible within the requirements of sound feeding. Tests indicate that a thickness of about 10 per cent of the riser diameter plus 0.2 in. is safe—By P. K. SANDELL

Melting in the Hot Blast Cupola 96
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Die Casting Congress Technical Program . . . 118
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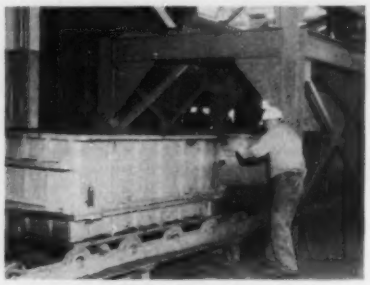
EDITORIAL OFFICES: Penton Building, Cleveland 13, Ohio. Main 1-8260. Branch Offices: New York, Detroit, Chicago, Pittsburgh, Washington, London.

FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions. Subscriptions in the U. S., possessions, and Canada for home-addressed copies and copies not qualified for under the above principles: One year, $10. Single copy, $1. Other countries: One year, $20. Single copy, $2. Published monthly by The Penton Publishing Co., Penton Building, Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

FOUNDRY is indexed in the Applied Science & Technology Index and the Engineering Index, generally available in libraries. Microfilm copies are available from University Microfilms, 313 N. First Ave., Ann Arbor, Mich.

THE EDITORS' WORKSHOP

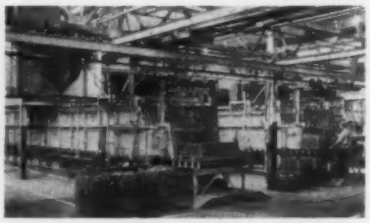
BATHTUBS: Few castings combine the bulk and thin metal sections that characterize the bathtub. Certainly no other castings of this type are produced in quantities



equal to those of this common household item. Need for high production has prompted development of highly efficient material handling in bathtub foundries, as exemplified by the new layout at the Universal-Rundle Corp., Camden, N. J. The accompanying view indicates the size of flasks required. Look for a description shortly.

MEETINGS: The fall season of meetings of foundry organizations is in full bloom. This issue contains reports on the recent International Foundry Congress and gatherings of the American Die Casting Institute, Steel Founders' Society of America, and the National Foundry Association. Proceedings at seven other association meetings and regional conferences will be detailed next month.

ANNEALING: A variety of equipment is available for the annealing of malleable iron. Volume of pro-



duction, grades of malleable produced, and other factors will dictate the selection of the type of furnace. For a general review of this subject, see the December issue.

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CHEM-REZ "100"

PRODUCTION FOUNDRIES... get PRECISION CORES at HIGH SPEED and LOW COST

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the foundry industry's MOST VERSATILE resin

Not since the introduction of ADM's CHEM-REZ "A-200" has a resin caused such excitement among foundrymen.

The speed, accuracy, quality and economy now possible with CHEM-REZ "100" is hard to believe without seeing it perform in your own shop. Start reaping the extra profits today . . . call your ADM—MAN to arrange a demonstration.

CHEM-REZ "100" FITS YOUR CURING SYSTEM

Although developed for hot box application, this resin is exceptionally versatile . . . can be used in dielectric and oven baking systems. Mixtures, of course, vary slightly depending upon the curing system. For instance, in dielectric and conventional systems, it is desirable to add small amounts of Archer Cereal, Green Bond Western Bentonite, and water to the basic mix used for hot box application.

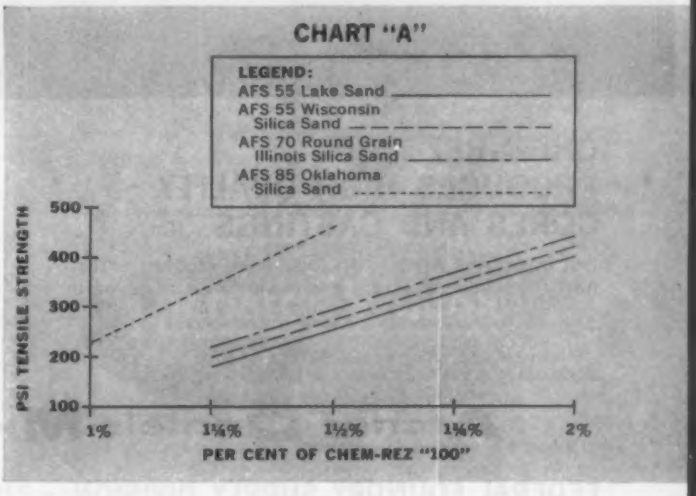
CHEM-REZ "100" NEEDS NO SPECIAL MIXING EQUIPMENT

Mixing of this resin and catalyst into sand is not difficult since the resin is a liquid and all sand grains quickly and easily coated. Thus, mixing takes only a few minutes and existing mullers or mixers can be used.

CHEM-REZ "100" PERMITS USE OF MOST SANDS

Sand grain sizes and structures are not particularly critical. Silica sands not exceeding .3% clay content and within the grain size range of AFS 50 to AFS 100 are preferred. Fairly fine sands can be used for the hot box process without inducing gas problems as indicated on Chart B. Chart A shows tensile strengths attained with several different types of sands.

CHART "A"



*In Canada, manufactured and sold under the trade-name, ADMIREZ "100".

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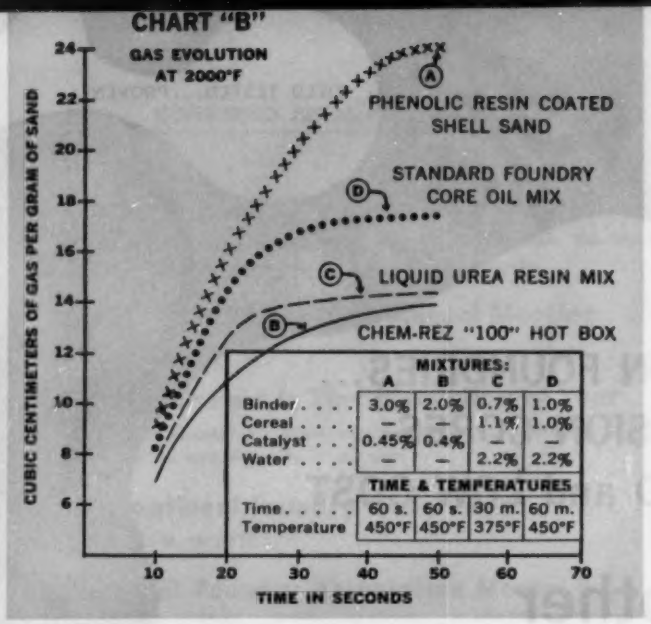
CHART "B"
GAS EVOLUTION AT 2000°F
CUBIC CENTIMETERS OF GAS PER GRAM OF SAND
TIME IN SECONDS
A PHENOLIC RESIN COATED SHELL SAND
D STANDARD FOUNDRY CORE OIL MIX
C LIQUID UREA RESIN MIX
B CHEM-REZ "100" HOT BOX
MIXTURES:
A B C D
Binder 3.0% 2.0% 0.7% 1.0%
Cereal — — 1.1% 1.0%
Catalyst 0.45% 0.4% — —
Water — — 2.2% 2.2%
TIME & TEMPERATURES
Time 60 s. 60 s. 30 m. 60 m.
Temperature 450°F 450°F 375°F 450°F

CHEM-REZ "100" DOES NOT DEMAND RADICAL SYSTEM CHANGES

With this versatile resin, foundrymen do not have to learn a tedious new technology. Mulling, blowing and stripping are not critical and do not involve highly specialized techniques. Any foundry geared to handle wet type core mixtures will have no difficulty adapting to CHEM-REZ "100". In using the hot box system, however, blowers have to be modified to handle heated core boxes.

CHEM-REZ "100" OFFERS SUPER-SPEED PRODUCTION

Blowing the resin bonded mixture into core boxes preheated to 400° to 500°F. permits stripping within 15 to 45 seconds . . . as soon as a shell is formed on the core. At this point the core can be handled while the curing continues through chemical reaction triggered by heat. CHEM-REZ "100" cores collapse completely and shake out fast.

CHEM-REZ "100" REDUCES MATERIAL AND PRODUCTION COSTS

Besides the dollar saving from shorter sand preparation and curing cycles, CHEM-REZ "100" reduces the cost of the mixture considerably. Cost of the resin, itself, is about 30% less than a phenolic resin for shell core production. Furthermore, less resin is used and no release agent is needed for hot box application. High strength of the cores reduces core scrap. Chart C reveals basic time-cost comparisons between typical CHEM-REZ "100" Hot Box Cores and Phenolic Shell Cores.

CHART "C"

TIME-COST COMPARISON PROVES PROFIT POTENTIAL OF CHEM-REZ "100"

PROCESS	COST OF RESIN	COST OF TYPICAL MIXTURE	CURE CYCLE	SAND PREPARATION TIME
CHEM-REZ "100" HOT BOX PROCESS Typical Mix: Sand . . . . . 100 lbs. Resin . . . . . 2 lbs. Catalyst . . . . . 0.6 lbs. Release Agent . . . . . None	16.3¢** per lb. delivered	37.4¢ per 100 lbs. of sand	30 sec. at 400° to 450° F	½ to 3½ minutes
PHENOLIC RESIN SHELL PROCESS Typical Mix: Sand . . . . . 100 lbs. Resin . . . . . 3 lbs. Catalyst . . . . . 0.45 lb. Wax . . . . . 0.09 lb.	23¢ per lb. delivered	84.6¢ per 100 lbs. of sand	50 sec. at 500° to 550° F	6 to 15 minutes

CHEM-REZ "100" PRODUCES HIGH QUALITY CORES AND CASTINGS

Hot box cores made with this resin have an extra-hard, smooth, moisture resistant finish. They are dimensionally stable, non-thermoplastic, and will not warp or sag. During pouring, these cores are highly resistant to metal penetration, erosion and veining. Their high strength, low gas content and fast shake-out properties make them ideal in the production of intricate automotive type castings such as manifolds and water jackets.

**East and North of Kansas City. Price subject to change without notice.

CHEM-REZ "100" and CHEM-REZ "A-200"...
DEVELOPED, MANUFACTURED and DISTRIBUTED BY:

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Circle 556 on Page 55

CONVEY CORES & CASTINGS OVERHEAD ...SWIFTLY SAFELY & ECONOMICALLY WITH R-W "Zig-Zag"®

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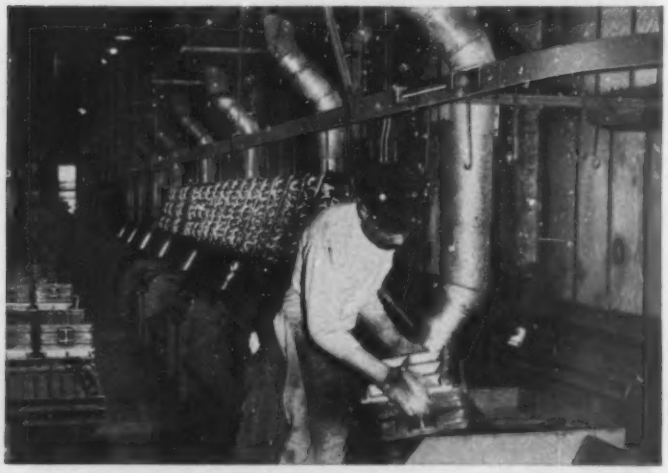

R-W "ZIG-ZAG" Conveyors provide a cost, space time saving way to move die castings from the casting operation through cleaning, grinding and checking stations and on to shipping. Smooth continuous product flow speeds-up production; eliminates costly bottle-necks.

Speed-up production, cut handling costs, eliminate breakage and increase profits with an R-W "ZIG-ZAG" Conveyor. Unit loads of up to 125 lbs. are carried up, down, in, out and around at a speed to meet your particular requirement. They are strong, flexible, efficient and safe... all moving parts of the chain are fully enclosed and protected from dirt and dust. "ZIG-ZAG" conveyors are economical to purchase... economical to operate and maintain... economical to install. May be installed and later expanded or altered by plant personnel. Write today... request Catalog A-93R.

FOR FAST, SAFE LADLE HANDLING

Reduce handling costs safely and speed-up production with R-W Crane and Monorail Conveyor Systems. Whether you need a single unit for a specific job or a complete system, R-W cranes and Monorail Conveyors provide smooth, safe ladle handling plus 100% utilization of the pouring area. Transfer cranes with safety interlocks at transfer points provide flexibility and easy handling throughout pouring operations. Let an R-W Sales-Engineer show you how R-W equipment can save you time, money and maintenance costs. Write today for complete information.

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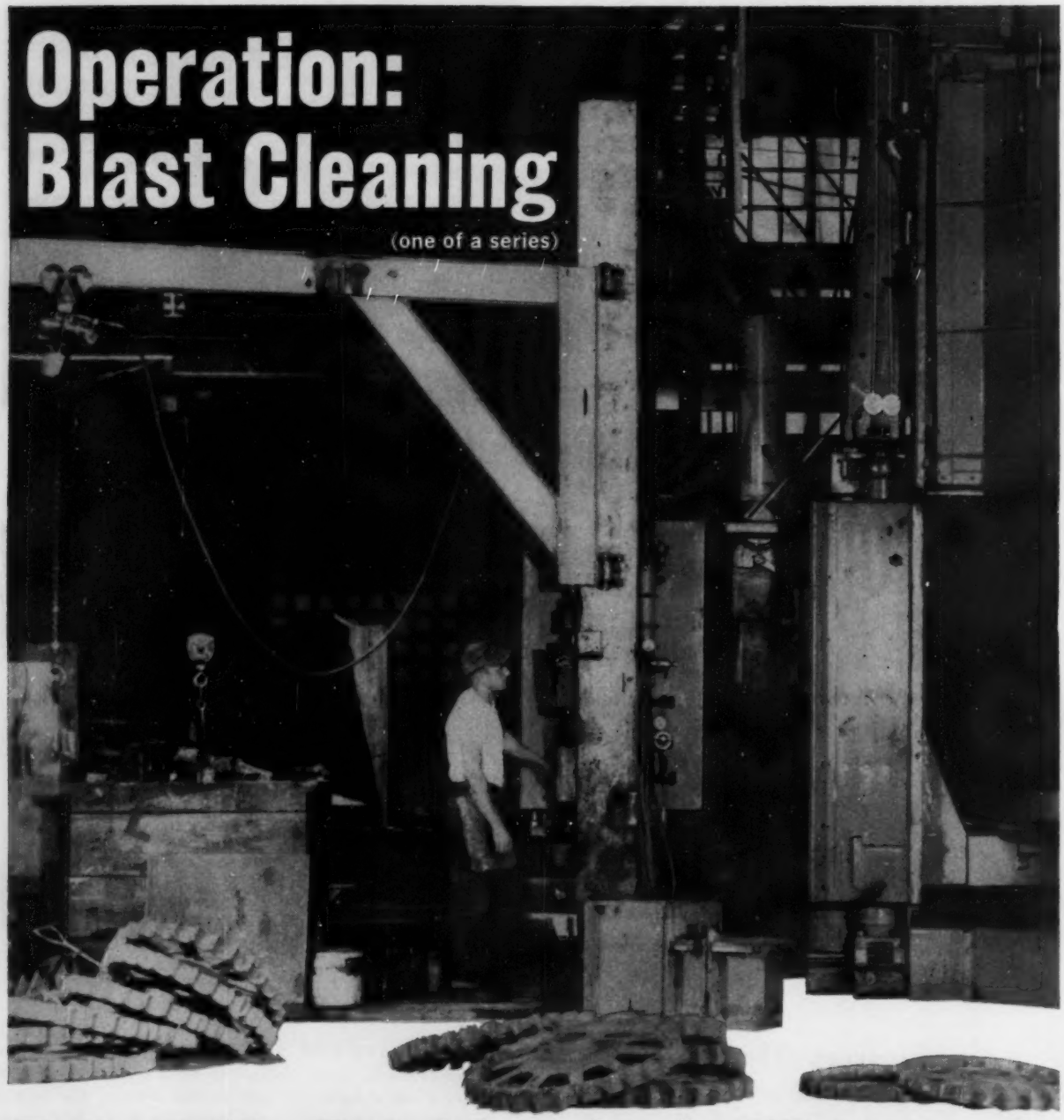
Operation: Blast Cleaning

(one of a series)



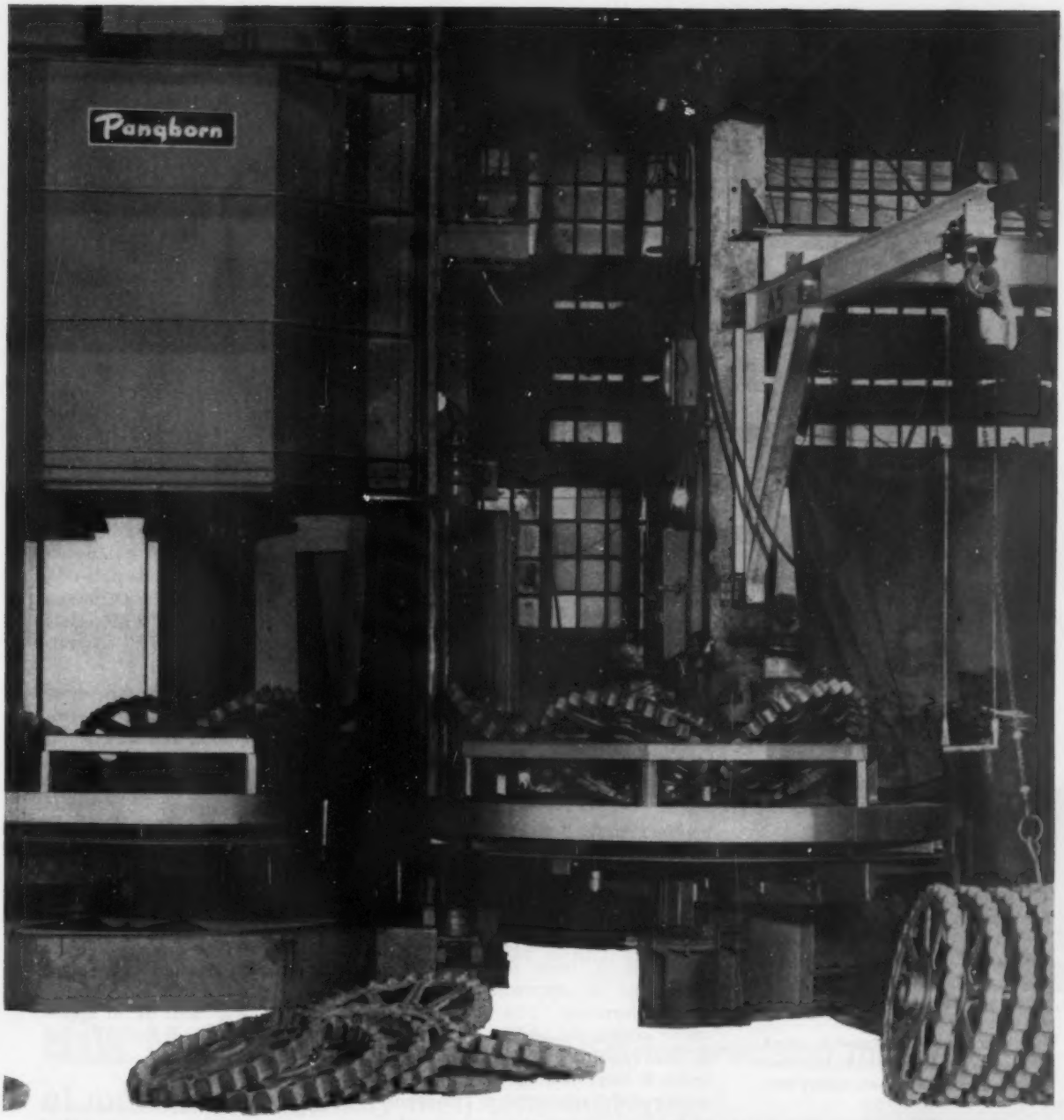
Twin-table Rotoblast hurls 50 tons of

Here's why the Pangborn Rotoblast "LM" Table Room doubled the capacity of the cleaning department at Harrison Steel Castings Co., Attica, Ind.

Inside the "LM" Table Room two Rotoblast Wheels throw 100,000 lbs. of abrasive at the castings every hour. This is blast power at its best. The abrasive hurled in a pattern designed to clean thoroughly every spot on every casting, even on bulky pieces up to 8′ in diameter.

During the cleaning process, castings rest on a rotating work table which increases the efficiency of the blast pattern. While one table is in the machine, its twin is being loaded outside. This makes for quick, continuous operation.

The tables are accessible from all sides (an exclusive Pangborn feature). They handle easily and can be pushed by hand with little effort. In the loading process, their weight is supported by a stationary



shot per hour... cleans twice as fast!

floor pedestal—rather than door hinges—for long life and trouble-free operation.

If the Pangborn "LM" Table Room has doubled the capacity of Harrison's cleaning department, it can do the same at your plant. For complete information write to: PANGBORN CORPORATION, 1400 Pangborn Boulevard, Hagerstown, Maryland. *Manufacturers of Blast Cleaning and Dust Control Equipment—Rotoblast® Steel Shot and Grit.* ™

Let Rotoblast abrasives cut your cleaning costs. A special heat treating process makes Rotoblast Steel Shot and Grit solid and tough, so that they can stand up to much more punishment than ordinary abrasives. Since they last longer, they can make many more passes than run-of-the-mill abrasives. Rotoblast Steel Shot & Grit can reduce your abrasive replacement costs considerably, and thereby decrease your cleaning costs.

Pangborn
OF HAGERSTOWN

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"Mark of Quality"

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- **REAL ECONOMY**—Pound for pound of melted metal, it costs less when you use Tiffin Foundry Quality Pots.
- **SPECIAL POTS** available. Send us your specifications.
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THE TIFFIN FOUNDRY, INC.
TIFFIN, OHIO

Circle 559 on Page 55

With the Editors

CENTENNIAL: Members of the Steel Founders' Society at their recent fall meeting learned that the steel castings industry will be 100 years old next year. If the early attention to this event is any indication of what is to come, the centennial celebration of steel castings will be a humdinger.

At no time were those in attendance permitted to forget that a birthday is coming up. The invitation to the opening reception, sponsored

by National Malleable & Steel Castings Co., was in the form of a paperweight with the centennial design (page 166) mounted on a black plastic base. On one side of the room the central design was presented in a large floral display made up of approximately 600 chrysanthemums. The illustration above shows the society president, Wilson H. Moriarty, National Malleable & Steel Castings Co., and the author of this column with a portion of the floral design as a background. Mr. Moriarty is on the left.

Speakers mentioned the centennial as the basis for several projects, and B. P. Hammond, Blaw-Knox Co., traced the early history of the industry and the society as a background to building broader markets.

From our vantage point, it would seem that every member of the steel castings industry has much to gain in really beating the drums for steel castings during 1961.

And this can just be the start for greater marketing programs in the years to come.

To Rockets: Through the kindness of the boys over at the headquarters of the Gray Iron Founders' Society, the editors of FOUNDRY were privileged to attend a press conference and see the premiere of a new promotion movie entitled "Rice Bowls to Rockets." This is the first of nine movies and film strips dealing with gray iron castings prepared by the society under the sponsorship of the American Coke & Coal Chemicals Institute and the merchant coke producers of the country.

The lead-off film is exceptionally good, both in concept and execution. It is in color, and was developed to be of interest to metalworking executives, product engineers, and the general public. The society and the institute are to be congratulated.

The effectiveness of this noteworthy marketing project depends on the members of the society. If every gray iron foundryman will see that the film is shown to his customers and groups that would be interested, the industry will get a great deal of mileage out of "Rice Bowls to Rockets."

Historical Data Needed: Earl J. Heydinger, historian, U. S. Department of Interior, Hopewell Village National Historic Site, R. R. 1, Elverson, Pa., has sent us an appeal for information that is needed in restoring an ironmaking community. His request is as follows:

"While cast house restoration at the Hopewell Village site is several years in the future, considerable information is needed now on furnishings, flasks, etc. To be more definite, was a cast house area of approximately 3675 sq ft (which probably contained a cupola in 1817) of sufficient size for effective work by 16 molders on a single shift? We have molding records (all before 1844) showing production about every third day.

The men were paid $8, 10 and 12 a ton in the late 1830s, probably depending on the difficulty in making the mold. Earlier, in 1816-17,

BETTER
METAL CASTING WITH
HARBISON-WALKER
REFRACTORY MOLD MATERIALS

H-W Flintgrain for ceramic shell molds

H-W FLINTGRAIN is an alumina-silica product of high refractoriness having very desirable low thermal expansion characteristics.

The angular grain shape and optimum size distribution make H-W FLINTGRAIN ideal for securing maximum compactness in the mold. It is used with special benefit for making ceramic shell molds and for similar applications in which dense, compact mold sections of greatest volume stability at all temperatures are of paramount importance.

Illustration of angulate shape of H-W Flintgrain enlarged x3

H-W Mullite Grains and Flours for precision molding of metals at extremely high temperatures

These H-W Mullite products by virtue of their high-alumina composition and low content of basic oxides are exceedingly refractory. The hard dense grains are strong and most resistant to fluxing. Excellent thermal stability accounts for their unusual constancy of volume up to their temperature limit. The maximum thermal expansion of these mullite products is approximately 0.6 per cent which is less than half that of silica sand. These are the properties which make them especially suitable for precision casting work at high temperatures with particular benefit for various non-ferrous and ferrous alloys.

Illustrated here is a typical two-part mold in H-W Mullite material made for the precision casting of a beryllium-copper alloy.

HARBISON-WALKER REFRACTORIES CO. and subsidiaries

World's Most Complete Refractories Service **GENERAL OFFICES: PITTSBURGH 22, PENNA.**

HW 60-28

Circle 560 on Page 55

Foundry Proved for Maximum Efficiency!

HAUSFELD TILTING CRUCIBLE FURNACES

- trouble-free tilt . . . *holds* in any position
- heavy duty cast iron trunnions surrounded by roller bearings
- precision-machined throughout
- arrives factory-assembled, factory-tested to operating temperature
- exclusive Hausfeld swing-top compensates for various size top covers

With crucible sizes from #40 to #400, there is a Hausfeld Tilting Furnace to help you boost your plant's efficiency. Write for full details today.

THE CAMPBELL-HAUSFELD CO.,
300-R Moore St., Harrison, Ohio

CAMPBELL-HAUSFELD
METAL MELTING FURNACES

molders received $1.75 to $2 a stove. The furnace, by tradition, was tapped about every 12 hours if pigs were produced, which occurred regularly during stovemaking periods."

Mr. Heydinger hopes that historically minded readers of FOUNDRY may be able to help answer many questions. If you have any information, why not write to him?

No Little Plans: Speaking before a recent meeting of the Society of Business Magazine Editors, Herbert R. Mayes, editor of *McCall's* and one time a business paper editor, painted an interesting picture of the editor's opportunities for service and responsibilities to his readers. I was particularly impressed with the following paragraph from that talk, because it seems to sum up the philosophy of FOUNDRY's editors:

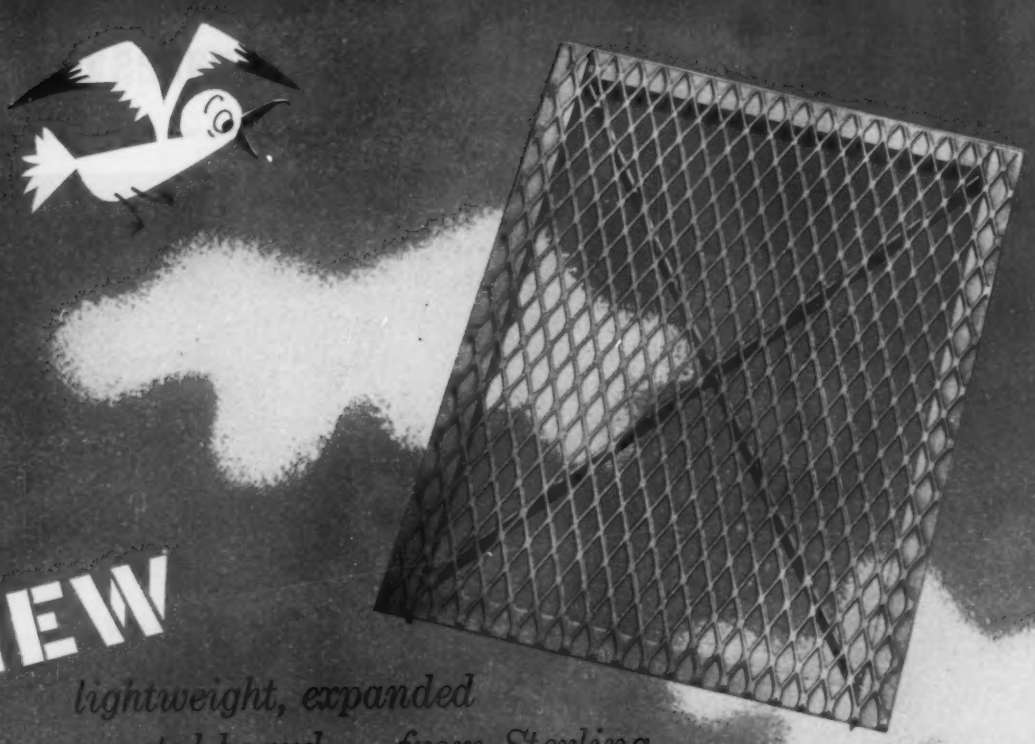
"Ours is a full-time, all-time business, a day and night and weekend business. It can have no regular hours. In the editorial sphere there is no room for union minds or union thinking. Ours is an empirical business and all is grist to our mill. Each day is a challenge, and the editor worth remembering never approaches his morning desk without a full and overflowing measure of enthusiasm.

"Now and then he pauses in his rounds and says to himself, '*Nothing* is too good for my readers,' and believes it and acts on it, because he has limitless faith in the printed word. Now and then he pauses in his rounds and says to the members of his staff, 'What ideas have you *not* suggested to me because you think I'd dare not use them?' "

The Mayor: We are pleased to report on another foundryman who is serving his community in public office. The Milwaukee *Journal* for Aug. 20 carries a fine article on Merlin G. Rostad, president, Rostad Aluminum Corp., Grafton, Wis., who is serving his second term as mayor of Cedarburg, Wis.

Mayor Rostad entered the foundry after the war as manager of Alumicast Corp., Chicago. Later he joined Meta-Mold Aluminum Co., Cedarburg, and in 1954 started his own company. The firm has 60 employees, a modern plant, and specializes in permanent mold castings.

F. G. S.



NEW

lightweight, expanded metal board . . . from Sterling

a really new idea in

BOTTOM BOARD/CORE PLATE CONSTRUCTION

Sterling engineers have developed a flattened expanded metal bottom board — or core plate — that combines these significant advantages:

- Lightweight, all-welded construction cuts handling time, speeds production
- Rigid reinforcing members assure maximum strength, help prevent heat distortion
- Expanded metal plate provides unmatched venting and cooling characteristics as well as superior heat transfer during core baking
- Engineered to your specific foundry requirements — available with runners for use on conveyor systems; can be equipped with all popular types of clamps

Call your Sterling man today for more information. He'll be glad to show you how the advantages of this new bottom board/core plate can be put to work for your foundry.

Sterling

WORLD WIDE SERVICE

STERLING NATIONAL INDUSTRIES, INC.
Founded in 1904 as Sterling Wheelbarrow Co.
Milwaukee, Wisconsin, U.S.A.

ASSOCIATE: Sterling Foundry Specialties Ltd.
London • Bedford • Jarrow-on-Tyne, England

Circle 562 on Page 55

At Kennecott's new refinery... Twin Heroult Electric Furnaces designed

Copper cathodes are charged into the 13,500 KVA Heroult 90-ton electric arc furnace, one of two at Kennecott Refining's new plant south of Baltimore. American Bridge also fabricated and erected the plant's structural framework.

to keep 16,500-ton per month copper melt on schedule

Kennecott Refining Corporation's electrolytic copper refinery near Baltimore is the country's newest—a showplace of efficiency. One reason: a pair of 90-ton Heroult electric arc furnaces, each rated at 40 tons per hour.

Of nose-tilt design to facilitate launder pouring, they discharge a steady stream of molten copper (2150°) which is used in the horizontal casting of wire bars and the continuous casting of billets. One Heroult is on normal capacity operation while the other is a spare for use during relining, when the pre-heat furnace is down, or when additional production is required.

Copper cathodes are preheated to about 1400°F and door charged into the Heroult arc furnace on a peel arm crane. The three-phase power input utilizing ultra-high speed mechanical positioning for three 20" electrodes with high-speed sensitive regulators maintains a constant arc above the copper bath for uniform temperature casting.

The two 90-ton Heroult arc furnaces can be tilted 40° forward and 15° backward. They feature mechanically positioned masts and special water-cooled skew-back roof rings that introduce water flow at the critical roof juncture to prevent warpage and burn out.

Whatever your arc-melt problem there is a Heroult electric arc furnace design for you. We've made them from 3 tons to over 200 tons capacity, for both swing roof top charge or door charge operation. They can accommodate induction stirring equipment, and can be designed for duplexing arrangements. And every Heroult is designed for maintenance by your own crew.

American Bridge has a complete electric furnace service that includes new installation, furnace modernization and part replacement. We'll be happy to quote on your building needs, too. Call our nearest office.

USS and Heroult are registered trademarks

American Bridge Division of United States Steel

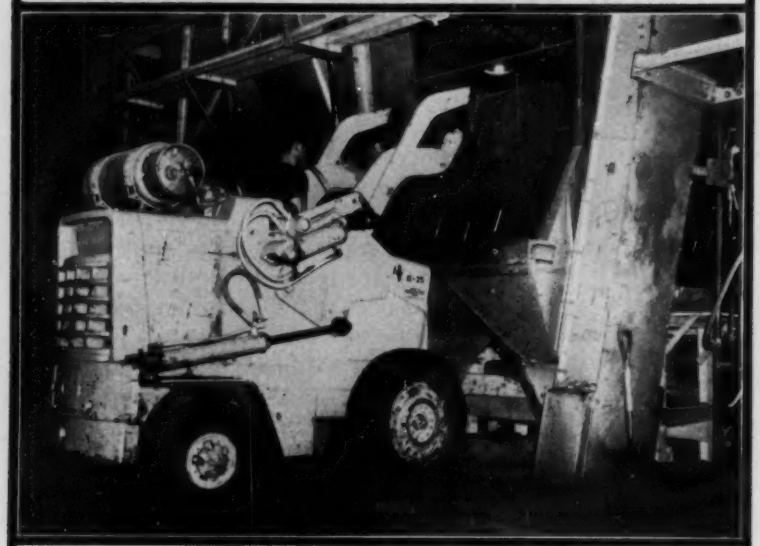
USS

General Offices: 525 William Penn Place, Pittsburgh, Pa. Contracting Offices in New York Philadelphia, Chicago, San Francisco, and other principal cities.
United States Steel Export Company, New York

This mark tells you a product is made of modern, dependable Steel.

Circle 563 on Page 55

Sand handling system built



around 3 PAYLOADER® units

Davis & Furber Machine Company of North Andover, Mass., specializes in manufacturing textile machinery. Since 1952 this company has been a continuous user of "PAYLOADER" tractor-shovels on its foundry floor. Two Model HA's (2,000-lb. operating capacity) handle sand, move materials, remove cupola waste and the like. Recently the firm added Hough's new H-25 (shown) to its "PAYLOADER" fleet. This unit is used principally during the molding operation, bringing sand from storage to supply a 4-station sand system. At night it returns the sand from the muller to storage.

You will find that an H-25 "PAYLOADER" tractor-shovel will pay for itself very quickly in savings alone —

OPERATING CAPACITY — Its 2,500-lb. capacity is 25% greater than has ever been available in a tractor-shovel of this size. Yet, it shuttles around corners, through narrow aisles, doorways and crowded yards, up and down ramps with speed and safety.

MECHANICAL FEATURES — The H-25 has a full reversing, power-shift transmission (no clutching) with two speed ranges forward and two in reverse, torque converter drive, power-steering (6-ft. turning radius), power-transfer differential and fast, powerful hydraulic bucket control.

A HOUGH DISTRIBUTOR is nearby to show you how the Model H-25 or a larger "PAYLOADER" (up to 12,000-lb. operating capacity) can increase output and lower costs on your bulk handling requirements. Contact him today or return the coupon below.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

☐ Send H-25 "PAYLOADER" data

☐ Other "PAYLOADER" units to 12,000 lb. operating capacity

Name
Title
Company
Street
City State

11-A-4

CALENDAR of Meetings

Nov. 1-3—Material Handling Institute Inc., Central States Show, Kentucky Fair and Exposition Center, Louisville.

Nov. 2-3—Investment Casting Institute, annual meeting, North Park Hotel, Chicago.

Nov. 3—American Gas Association, Metal Treating Symposium, New Englander Motor Hotel, Westport, Conn.

Nov. 3-4—Michigan Regional Foundry Conference, Bancroft Hotel, Saginaw, Mich.

Nov. 8-11—Society of Die Casting Engineers, First National Die Casting Exposition & Congress, Detroit Artillery Armory, Detroit.

Nov. 14-16—Steel Founders' Society, Technical and Operating Conference, Pick-Carter Hotel, Cleveland.

Nov. 30 - Dec. 2 — Metallurgical Society of AIME, Electric Steel Conference, Morrison Hotel, Chicago.

Dec. 2—Malleable Founders' Society, semi-annual meeting, Sheraton-Cleveland Hotel, Cleveland.

1961

Jan. 9-13—Society of Automotive Engineers, International Congress & Exposition, Convention Center, Detroit.

Jan. 23-26—Plant Maintenance & Engineering Show, International Amphitheatre, Chicago.

Feb. 9-10—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee.

Feb. 16-17—Southeastern Regional Foundry Conference, Read House, Chattanooga, Tenn.

Feb. 22-24—Alloy Casting Institute, Midwinter Management Meeting, Boca Raton, Fla.

Feb. 26-Mar. 2—American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, St. Louis.

March 1-2—Malleable Founders' Society, Technical & Operating Conference, Wade Park Manor, Cleveland.

March 11-14—Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

March 20-24—American Society for Metals, Western Metal Congress & Exposition, Pan-Pacific Auditorium, Los Angeles.

April 18-20—Foundry Educational Foundation, annual college-industry conference, Hotel Statler, Cleveland.

May 8-12—American Foundrymen's Society, Castings Congress & Exposition, San Francisco.

June 8-9—Malleable Founders' Society, annual meeting, Broadmoor, Colorado Springs, Colo.

June 18-20—Alloy Casting Institute, annual meeting, Homestead, Hot Springs, Va.

June 23-24—Penn State Regional Foundry Conference, Pennsylvania State University, University Park, Pa.

Sept. 18-20—Non-Ferrous Founders' Society, annual meeting, Shawnee Inn, Shawnee-on-Delaware, Pa.

Sept. 21—Cast Bronze Bearing Institute, annual meeting, Shawnee Inn, Shawnee-on-Delaware, Pa.

Sept. 24-26—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Oct. 18-20—Gray Iron Founders' Society, annual meeting, Royal York Hotel, Toronto, Ont.

Oct. 19-21—Foundry Equipment Manufacturers Association, annual meeting, Greenbriar, White Sulphur Springs, Va.

Oct. 23-27—American Society for Metals, National Metal Congress & Exposition, Cobo Hall, Detroit.

Nov. 13-15—Steel Founders' Society of America, Technical & Operating Conference, Hotel Carter, Cleveland.

Nov. 15-17—National Foundry Association, annual meeting, Savoy-Hilton Hotel, New York.

Circle 564 on Page 55

Pouring a 2000-lb. casting at ELECTRIC BOAT DIVISION, GENERAL DYNAMICS CORPORATION, Groton, Conn.

The U.S.S. GEORGE WASHINGTON, America's first POLARIS-firing A-sub

RCI Core Binders

Used in precision castings for America's A-Subs

● Precision castings are critical pieces in ELECTRIC BOAT'S gigantic A-sub production puzzle. Every phase of the project is tightly security-sealed. While it is no secret that a variety of A-sub valves, structural boxes, gear cases and other components, are poured — in aluminum-bronze, manganese-bronze, super-nickel and other metals — specifics are unavailable. One thing's for sure: castings must be perfect! And, it is reported that in operations where ELECTRIC BOAT is using RCI Core Binders, they find that excellent results are obtained.

If you have a core binding problem, chances are RCI has already found the answer. Liquid phenolic, liquid amino and liquid oleoresinous core binding resins, liquid sand conditioners, liquid binders (self-curing), and liquid phenolic, powdered phenolic and granulated phenolic resins for shell coremaking and shell molding are all on the list of RCI Foundry Products. Let's talk about Reichhold resins in terms of *your* applications.

FOUNDREZ — *Synthetic Resin Binders*
COROVIT — *Self-Curing Binders*
coRCIment — *Core Oils*
CO-RELEES — *Sand Conditioning Agent*
REICOTE — *Sand Coating Agent*

REICHHOLD
FOUNDRY PRODUCTS

Creative Chemistry ... Your Partner in Progress

RCI

REICHHOLD CHEMICALS, INC.,
RCI BUILDING, WHITE PLAINS, N. Y.

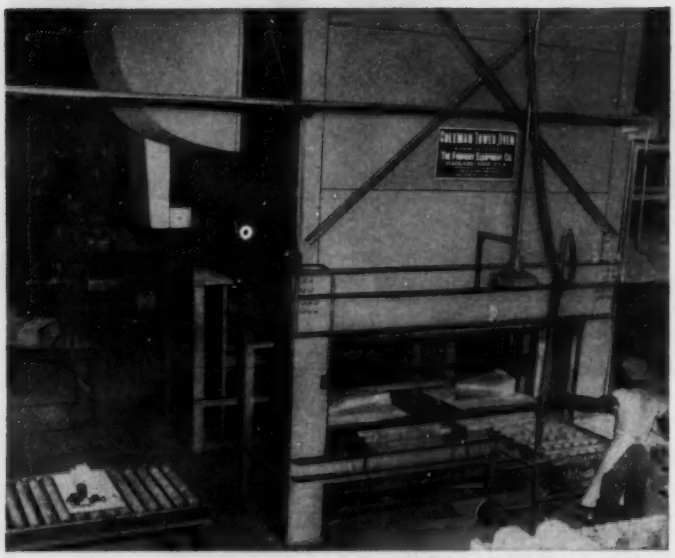
Circle 565 on Page 55

CUT LABOR COSTS

with

Coleman Dielectric Core Oven in leading plumbing fixture foundry. Direct labor alone reduced by 75%, with many other important savings and advantages.

Coleman Conveyor Core Ovens



Coleman Tower® Core Oven. One of two large installations in a major steel foundry. Mechanized handling and baking of cores up to 150 pounds at substantial annual savings.

● **Performance records in all types of foundries prove that Coleman Conveyor Core Ovens reduce core department costs by as much as 50%!**

Coleman Ovens quickly pay for themselves out of direct savings in labor, materials and reduced casting scrap.

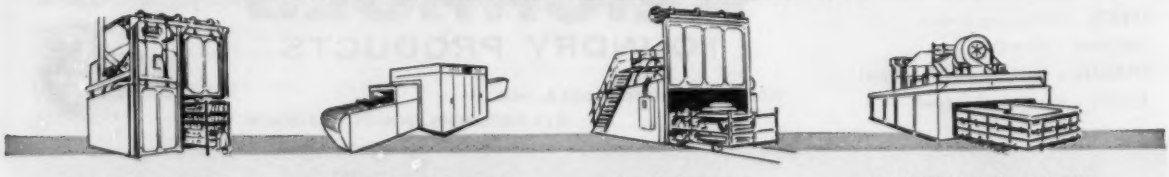
As builders of the world's only complete line of foundry ovens . . . dielectric or recirculating heat . . . we can recommend, without bias, the right oven for your particular needs.

WRITE FOR BULLETIN 54

THE FOUNDRY EQUIPMENT COMPANY • **1821 COLUMBUS ROAD, CLEVELAND 13, OHIO**

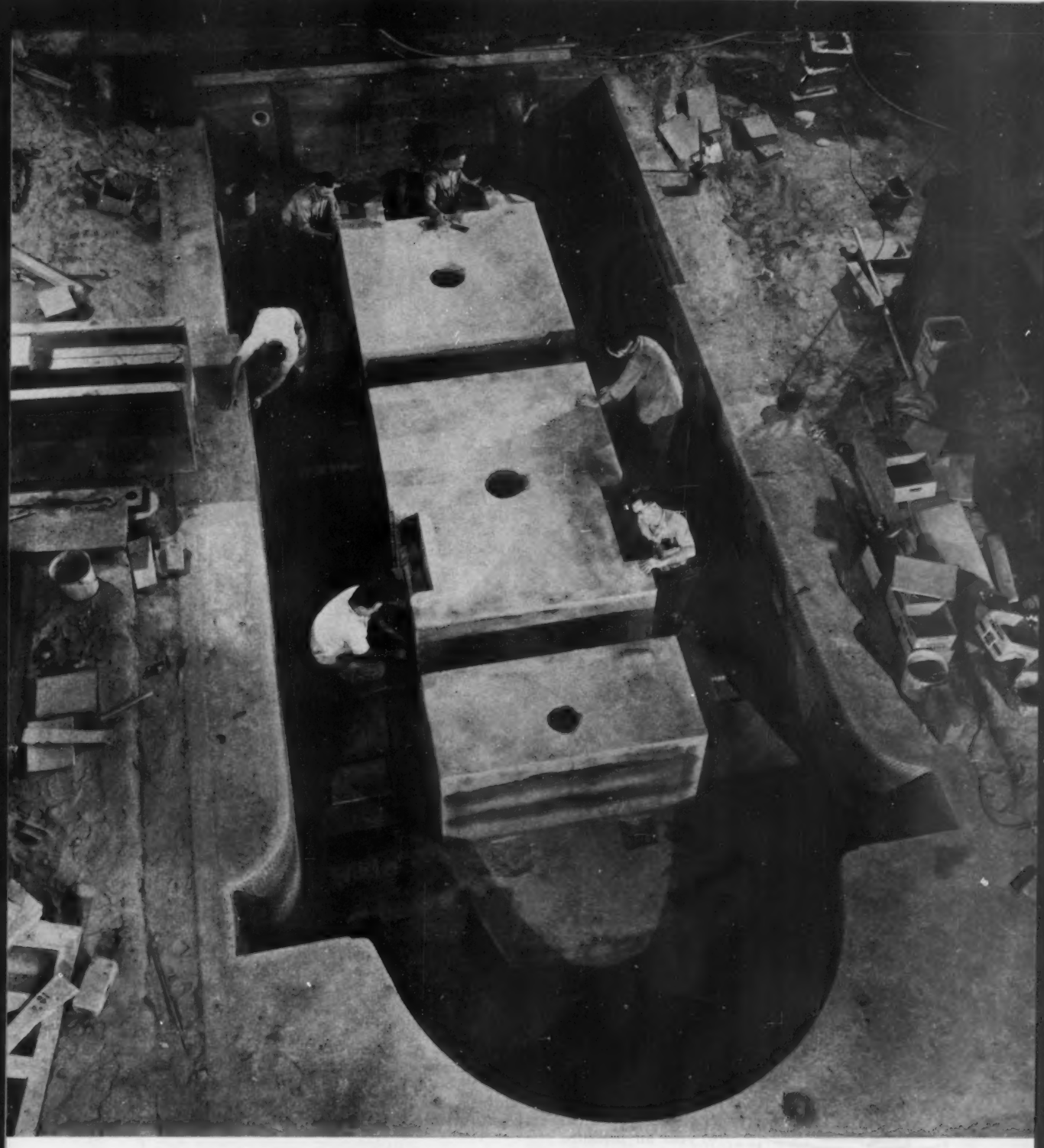
World's Oldest and Largest Foundry Oven Specialists—More than half a century of specialized foundry experience.

PART OF THE WORLD'S ONLY COMPLETE LINE OF FOUNDRY OVENS



TRANSRACK OVENS | DIELECTRIC CORE OVENS | CAR TYPE OVENS | JET ACTION MOLD OVENS

Circle 566 on Page 55



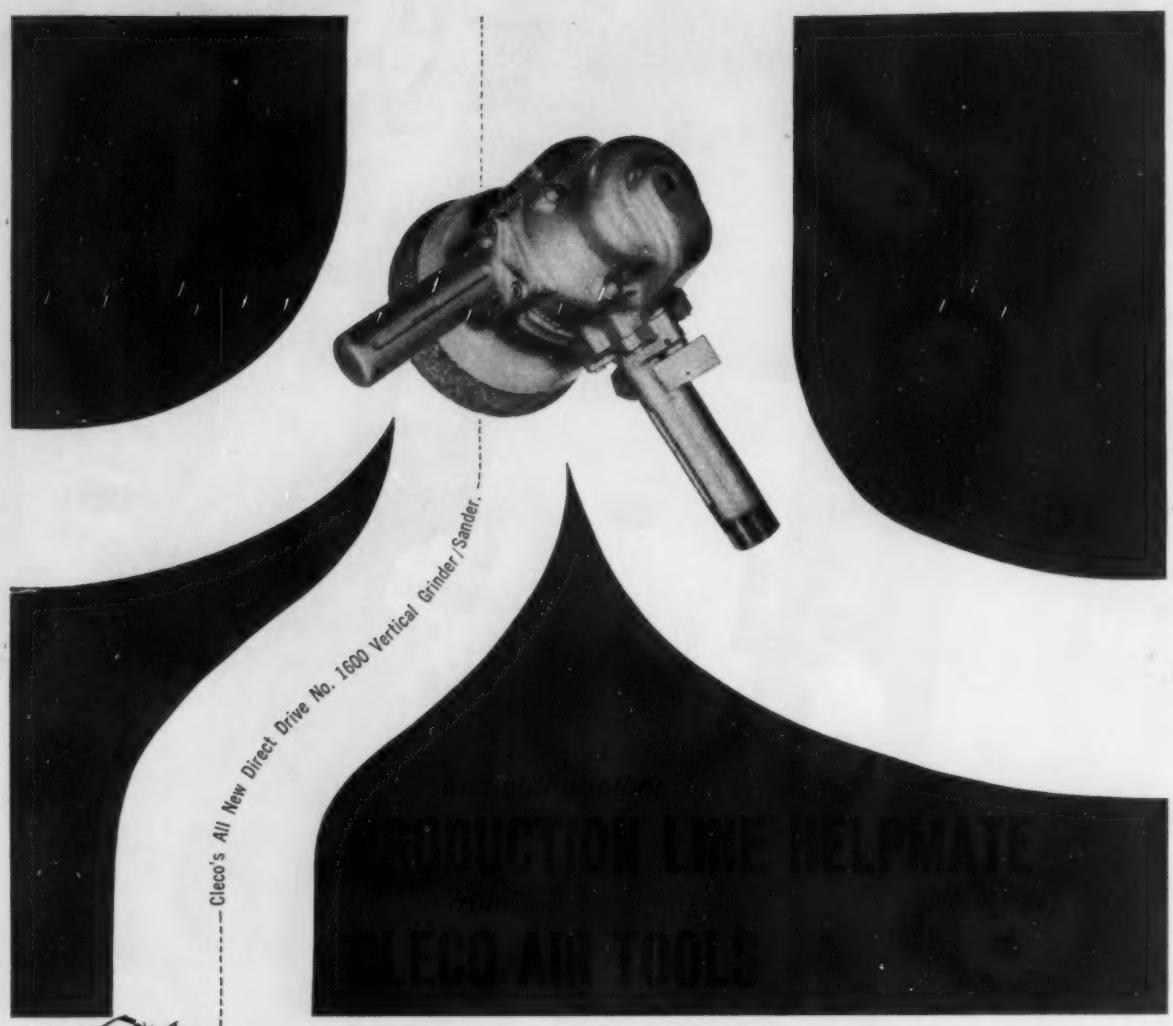
The cores and this mold for a 426,000 lb steel casting were made by Mesta Machine Company with Venango sand — one of 35 grades of foundry sand available from Pennsylvania Glass Sand Corporation. Next time you need sand or silica flour for any casting requirement, contact PGS.

PENNSYLVANIA GLASS SAND CORPORATION

INDUSTRIAL SILICA DIVISION PIONEER SILICA PRODUCTS CO.

Sales offices in New York, Pittsburgh, St. Louis and Dallas · **Plants** in Newport, N. J. · Mapleton, Pa. · McVeytown, Pa. · Utica, Pa. · Berkeley Springs, W. Va. · Dundee, Ohio · Geauga Lake, Ohio · Phalanx, Ohio · Klondike, Mo. · Pacific, Mo. · Mill Creek, Okla. · Brady, Texas.

Circle 567 on Page 55



This direct drive—governor controlled, vertical grinder/sander is a production booster. It maintains a safe high speed with medium-heavy work loads (where most of your grinding is rated). Cleco's No. 1600 Grinder has a high-strength, heat-treated aluminum casing and a built-for-safety, heavy spring governor. Its casing is constructed in one-piece, giving you a light weight tool that can take the bumping and dropping you know it will receive. This feature plus the tool's inherent low maintenance features will endear the No. 1600 Grinder to every maintenance department.

OTHER IMPROVEMENTS INCLUDE: A choice of throttle arrangements . . . 1) Butterfly on-and-off safety throttle; 2) Butterfly on-and-off with throttle detention; 3) Standard lever throttle. A dead handle that can be positioned from 90° to 120° from throttle handle, or it may be removed entirely for close work. A remarkably safe, stainless steel governor that can be custom-set to your air pressure.

CLECO'S No. 1600 Grinder/Sander weighs only 7½ lbs., is 7 ins. high, and utilizes a 6 in. cupwheel. Available in three speeds: 4500, 6000, and 8000 r.p.m. FOR A DEMONSTRATION-TRYOUT, CALL YOUR LOCAL CLECO® REPRESENTATIVE. FOR DESCRIPTIVE LITERATURE, WRITE:

A Division of REED ROLLER BIT COMPANY
P. O. BOX 2119 • HOUSTON 1, TEXAS

IN CANADA: Cleco Pneumatic Tool Company of Canada, Ltd.
927 Millwood Road, Leaside (Toronto), Ontario

NEW ANSCO INDUSTRIAL X-RAY CALCULATOR SOLVES TECHNIQUE PROBLEMS AT A GLANCE

Here's an all new calculator designed to correlate all factors in industrial x-ray technique and give working answers as fast as you can move the slides.

- **PROVIDES COMPLETE INFORMATION**
- **READS ALL ON ONE SIDE**
- **READS FROM TOP TO BOTTOM**

Solves problems in:

a. exposure determination.
b. film speed-density relationships.
c. exposure compensation for density changes.
d. choice of film to meet scheduling problems.
e. techniques for multi-thickness specimens.
f. exposure compensation for kilovoltage changes.
g. sandwich techniques.
h. density determinations for various metal thicknesses.

In the shop this new calculator rapidly provides information for solving new problems.

In the classroom it gives students a visual working relationship with x-ray exposure parameters.

Ansco, Binghamton, N. Y., A Division of General Aniline & Film Corporation.

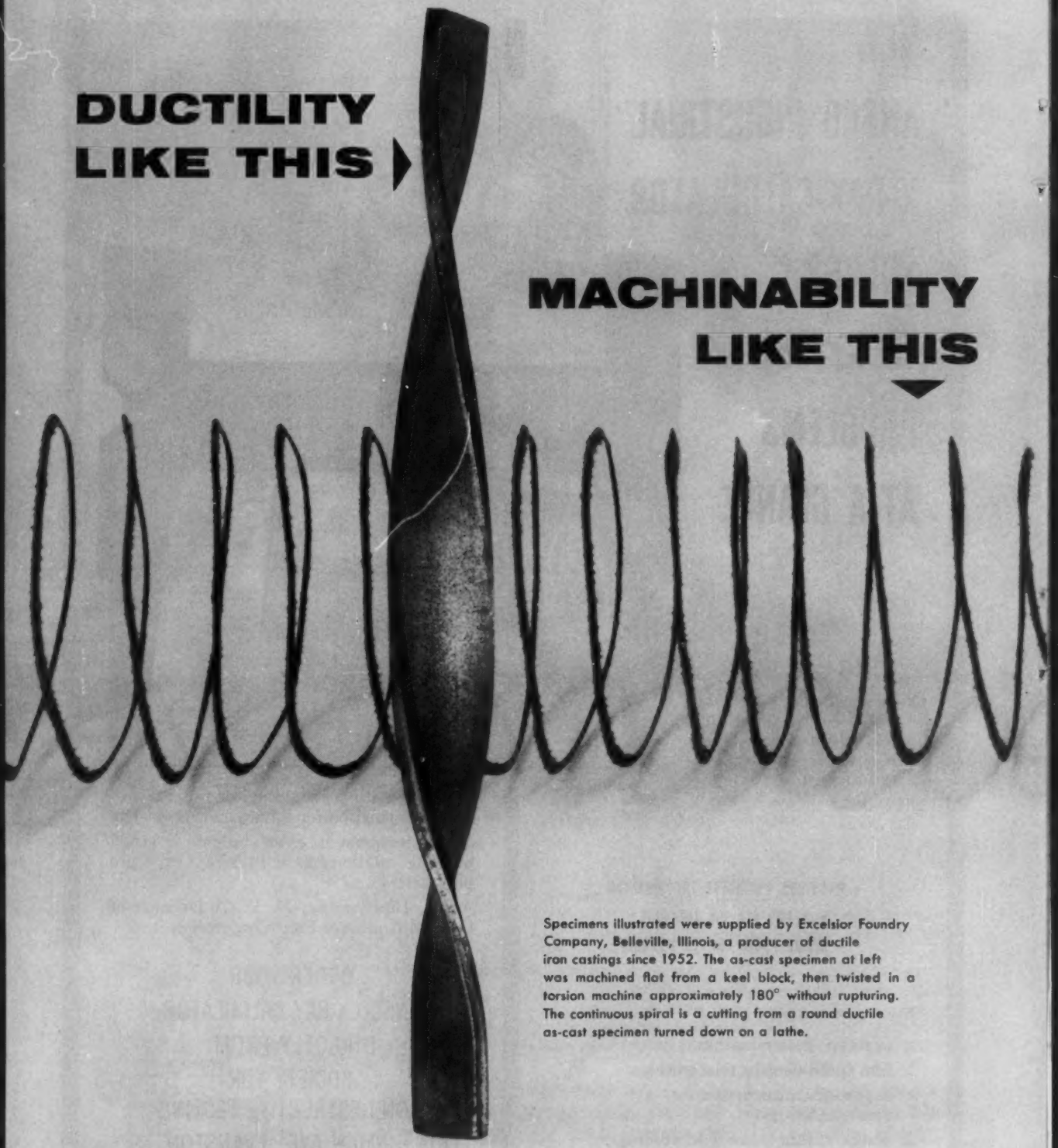
ORDER YOUR
ANSCO X-RAY CALCULATOR
DIRECTLY FROM:
SOCIETY FOR
NON-DESTRUCTIVE TESTING
1109 HINMAN AVE., EVANSTON, ILL.
PRICE $10.00

Ansco
X-ray

Circle 569 on Page 55

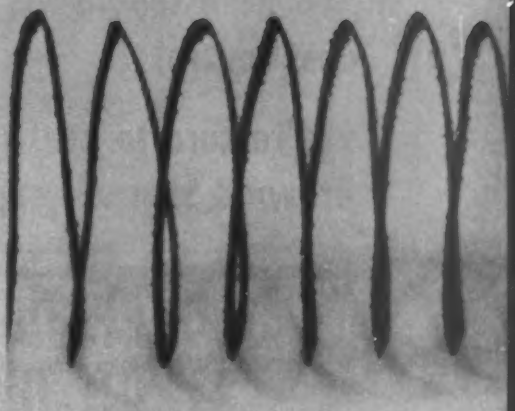
DUCTILITY LIKE THIS

MACHINABILITY LIKE THIS



Specimens illustrated were supplied by Excelsior Foundry Company, Belleville, Illinois, a producer of ductile iron castings since 1952. The as-cast specimen at left was machined flat from a keel block, then twisted in a torsion machine approximately 180° without rupturing. The continuous spiral is a cutting from a round ductile as-cast specimen turned down on a lathe.

. . . when Chateaugay Pig Iron is the base metal in ductile iron castings



The finest spheroidal graphite or ductile types of cast iron possess many of the engineering advantages of steel—ductility, high strength, toughness, machinability, heat- and wear-resistance—when they are produced with Chateaugay Pig Iron.

High total carbon and unusually low manganese, phosphorus, and sulphur content suit Chateaugay perfectly for production of high ductility as-cast grades of ductile iron.

Chateaugay's consistently uniform chemical analysis is an important factor in achieving as-cast properties, especially ductility. Freedom from excessive amounts of subversive elements assures the formation of graphite nodules. Additionally, the inherently excellent properties of Chateaugay Pig Iron are maintained in the ductile form.

Castings produced with Chateaugay are of consistently high quality with close grain and uniform structure. And, because it can be cast without excessive shrinkage, adjoining light and heavy sections are filled completely. This assures strong, flaw-free castings accurate to patterns and shapes.

To assist you in using Chateaugay to best advantage, Republic provides a complete foundry engineering service covering all phases of foundry operation—metallurgical, molding practice, gating, risering, and cupola practice. Contact your Republic representative, or mail the coupon for prompt service.

REPUBLIC STEEL

Producers of Industry's Most Complete Line of Merchant Pig Irons

REPUBLIC STEEL CORPORATION
DEPT. FO-9106 AR
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

☐ Have a Pig Iron Metallurgist call
☐ Send more information on Chateaugay

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Circle 570 on Page 55

Read how this Eastern foundry got efficient cupola dust control at a tremendous saving

IF you can operate your foundry with one cupola, and...

IF you need cupola dust control...

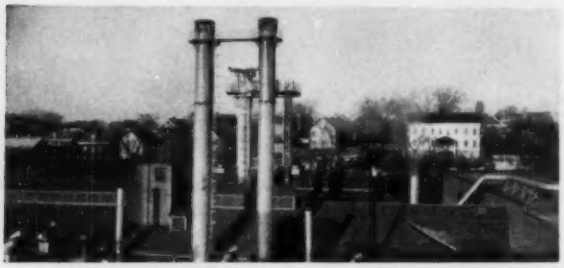
you're sure to profit from Brown & Sharpe's experience

Ingenious engineering — including an AAF AMERclone dust collector—has transformed an obsolete cupola into a modern one at Brown & Sharpe foundry . . . at a total cost far less than anyone thought possible. Here's how it came about:

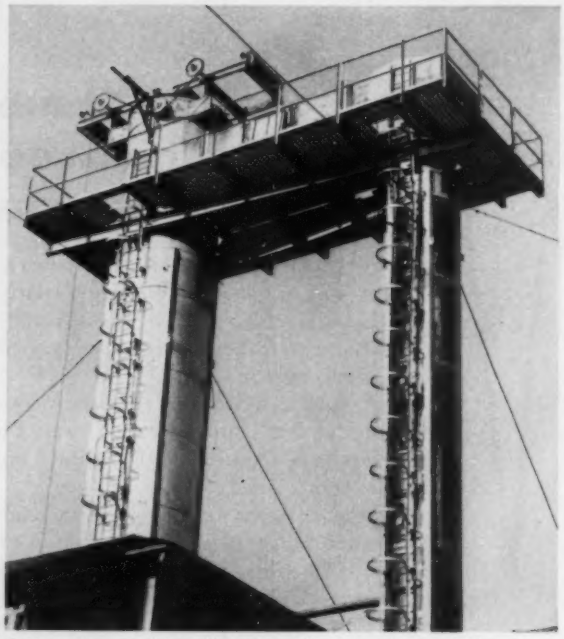
Brown & Sharpe needed effective dust control on one of their twin-cupola installations. But due to changes in the nature of castings produced, they no longer needed the *capacity* provided by both cupolas.

Selection of the dust collector was no problem. The AAF AMERclone is the proved collector for complete cupola dust control. Creative engineering took over from there. Instead of *building* a cooling tower for the dust collection system, one of the cupola stacks was converted into a cooling tower and became an integral part of a modern, single-cupola installation.

Thus, Brown & Sharpe transformed an over-capacity twin cupola that was creating a dust problem into a dust-free single cupola of realistic capacity — with an absolute minimum of new construction.



A view of Brown & Sharpe foundry, Providence, Rhode Island. In background is single cupola equipped with AAF dust control. Before conversion, it was similar to double-cupola installation in foreground.



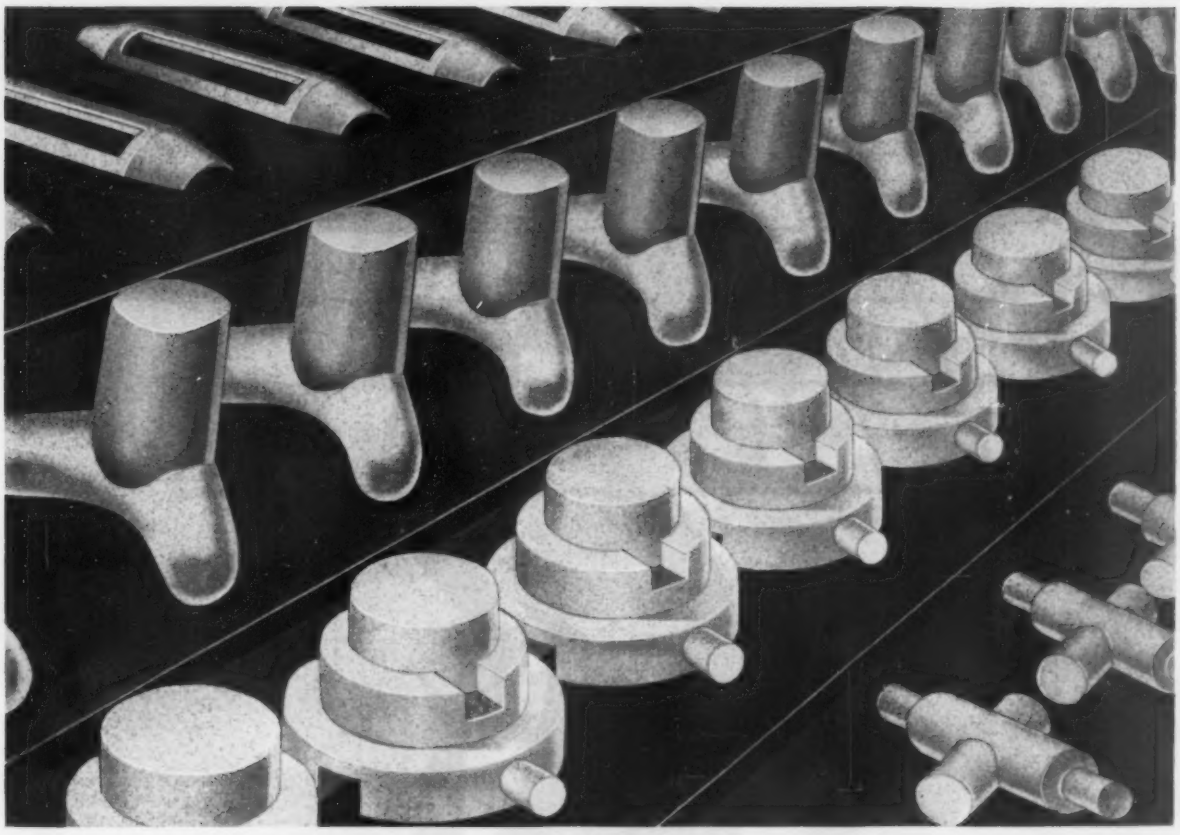
Closeup view of old double cupola after conversion to single cupola with AAF dust control. Old cupola at right now serves as a cooling tower for system.

The AAF AMERclone *gets* the particles that cinder catchers miss — the little particles that create the big problems. Dust is collected dry, simplifying disposal and eliminating possibility of corrosion of the collecting system. In many installations, one AMERclone handles two cupolas alternately, permitting full-time use of equipment.

AAF's complete line of dust control equipment was application-developed, now challenges *any* foundry dust problem.

If your problem is cupola dust, contact your local AAF representative, or write direct for Dust Control Bulletin 291. Address: Mr. Robert Moore, American Air Filter Company, Inc., 266 Central Avenue, Louisville, Kentucky.

AAF American Air Filter
BETTER AIR IS OUR BUSINESS



How New QO FURSET Resin Binders CUT CORE AND CASTING COSTS

Look at how QO FURSET can cut the cost of your foundry cores while simplifying final operations on your castings:

1. **Speed.** Cores in 15-30 seconds provide low production cost. Depending upon the size of the core and the heat of the box, cores are ready for removal from a hot core box in 15-30 seconds.
2. **High Strength.** Dry tensile strengths of 350 psi are obtained with only 1½% QO FURSET on clean sand.
3. **Easy Shakeout.** QO FURSET is designed for easy shakeout in both ferrous and non-ferrous castings to assure low cleaning costs.
4. **Dimensional Stability.** Castings can be made to closer tolerances with less machining required.

QO FURSET Offers Both Ferrous and Non-Ferrous Grades

QO FURSET Binder A-4090 is designed for use in ferrous foundries where hot strength and minimum gas evolution are desired.

QO FURSET Binder A-2590 provides somewhat lower hot strength and is designed primarily for use in non-ferrous foundries where low temperature collapse is desired.

Start reaping the rewards possible with QO FURSET. Write today for Technical Bulletin 501-A and prices.

The Quaker Oats Company
CHEMICALS DIVISION
338B The Merchandise Mart, **Chicago 54, Illinois**
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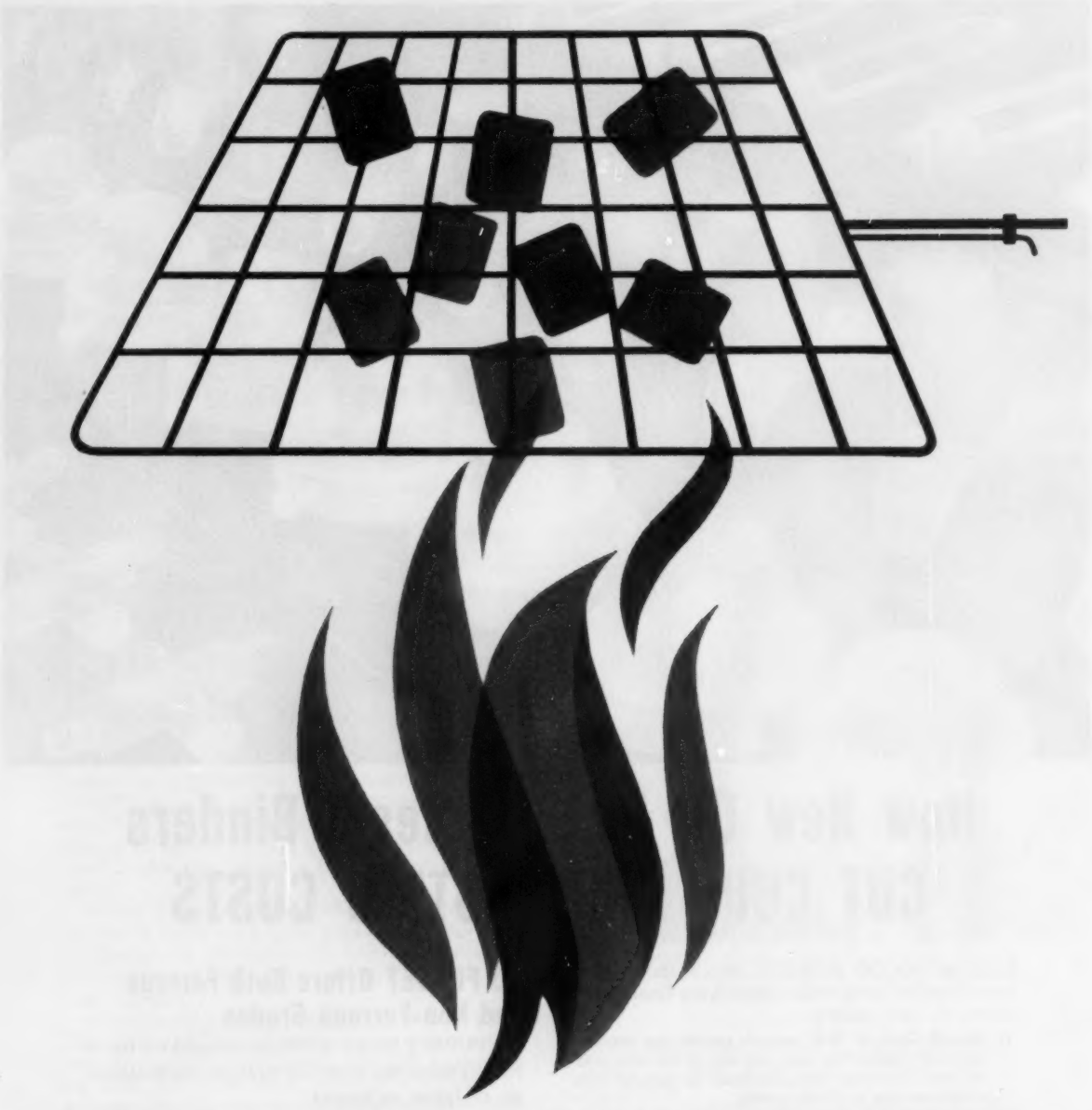
Room 538B, 120 Wall Street, **New York 5, New York**
Room 438B, 48 S.E. Hawthorne Blvd., **Portland 14, Oregon**
Quaker Oats Ltd., Bridge Road, **Southall, England**

Circle 572 on Page 55



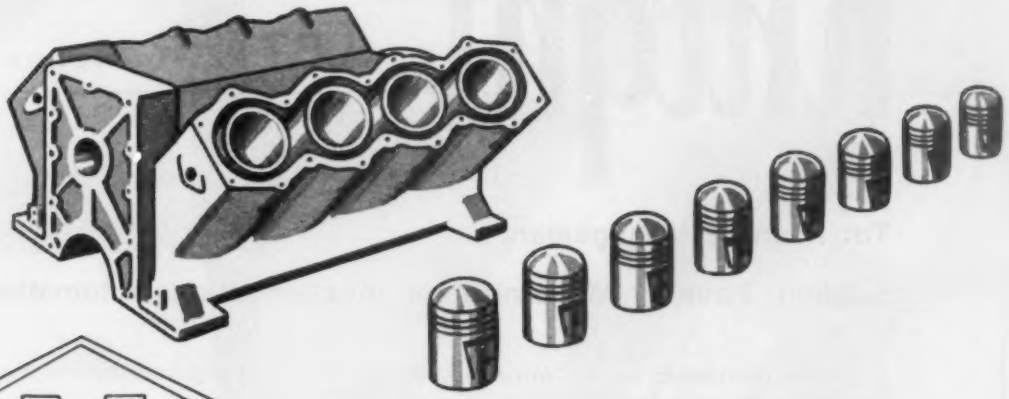
toasted nickel briquettes for low H_2 diet

Sherritt's recipe for making low-hydrogen nickel is as effective as it is simple: take pure nickel powder, press into uniform briquettes, and heat for a quarter of an hour at 1650°F. The result: pure nickel in its handiest form, with scarcely a trace of hydrogen. High-purity Sherritt nickel is also available in three standard grades of powder, special grades, and coated powders.

FOOTE MINERAL COMPANY *is the exclusive sales agent for Sherritt nickel and cobalt in the United States and Canada. For complete illustrated brochure with prices and delivery information, contact the Foote Mineral Company, 473S Eighteen West Chelten Building, Philadelphia 44, Pa.*

SHERRITT GORDON MINES LIMITED

From pistons to engine blocks...



PMD

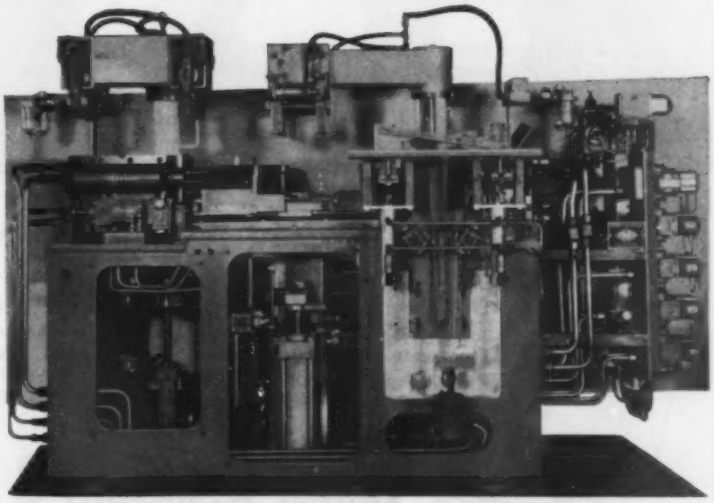
Automated Molding Equipment increases production, lowers costs

The designing and building of special automated molding equipment is an important part of the work at Permanent Mold Die Co. Typical of the equipment that PMD has developed for industry is this Automated Piston Molding Machine.

This machine incorporates the advantages of metal molds and cores, manual or automatic operation, and adaptability to various sizes of pistons. It has increased the rate of piston production almost 600%.

The automatic cycle on this particular machine includes insertion of dimension-control bands into the mold, assembly and disassembly of molds and cores, and transfer of completed pistons to customer's chute or belt conveyor. These PMD machines are designed to operate in groups of two, utilizing a single operator. The operator can pour at one machine during piston solidification at the other. These machines are also adaptable to automatic ladling. Most of the processes of this machine are hydraulically actuated and all the electric, hydraulic, and pneumatic functions conform to Joint Industry Conference Standards.

The machines developed and built by Permanent Mold Die Co., can produce small parts such as pistons, as well as large automotive aluminum castings. This equipment is developed to **your** specifications, to meet **your** particular needs.



PMD automated molding equipment offers you a wider production potential at relatively low cost. Investigate its advantages for your operation.

WRITE TODAY FOR DESCRIPTIVE BROCHURE

PMD

PERMANENT MOLD DIE COMPANY

2275 E. Nine Mile Rd. • Warren, Michigan • Phone: SLocum 7-8100

Circle 576 on Page 55

Knight LETTER (ONE OF A SERIES)

To: Foundry Management

Subject: Foundry Modernization, Mechanization, Automation

A question often asked me is: "Why should we use the Knight organization to help us develop and carry out a foundry modernization program?"

The following, we think, are some of the more important reasons to use a qualified, "outside" professional engineering organization for this important planning. The Knight organization:

1. Has key men with 10 to 30 years or more successful experience in foundry management, production, plant layout or equipment.
2. Is completely independent of any equipment company and therefore in position to recommend only the facilities required and best suited for the desired goal.
3. Has successfully completed more than 400 foundry assignments in 15 countries since 1945.
4. Has introduced standardization to facilitate maximum utilization of man and machine hours, reduced manual handling to a minimum, and eliminated interferences to the ability of men or machines to produce.
5. Has developed programs for foundries with as few as 50 and as many as 2,500 employees, and from 5 to 2,000 tons of castings per day.
6. Offers prudent, progressive management the means, not only to check its plans, but to be certain to bring all objective experience to the program.
7. Offers the most experienced professional group for temporary assistance to plan and achieve increased profitability for any foundry.

Lester B. Knight

KNIGHT SERVICES INCLUDE:

Foundry Engineering • Architectural Engineering • Construction Management • Modernization • Mechanization • Automation • Survey of Facilities • Materials Handling • Methods Industrial Engineering • Wage Incentives • Cost Control • Standard Costs • Flexible Budgeting Production Control • Organization • Marketing

EVIDENCE OF EXPERIENCE

Lester B. Knight & Associates, Inc.

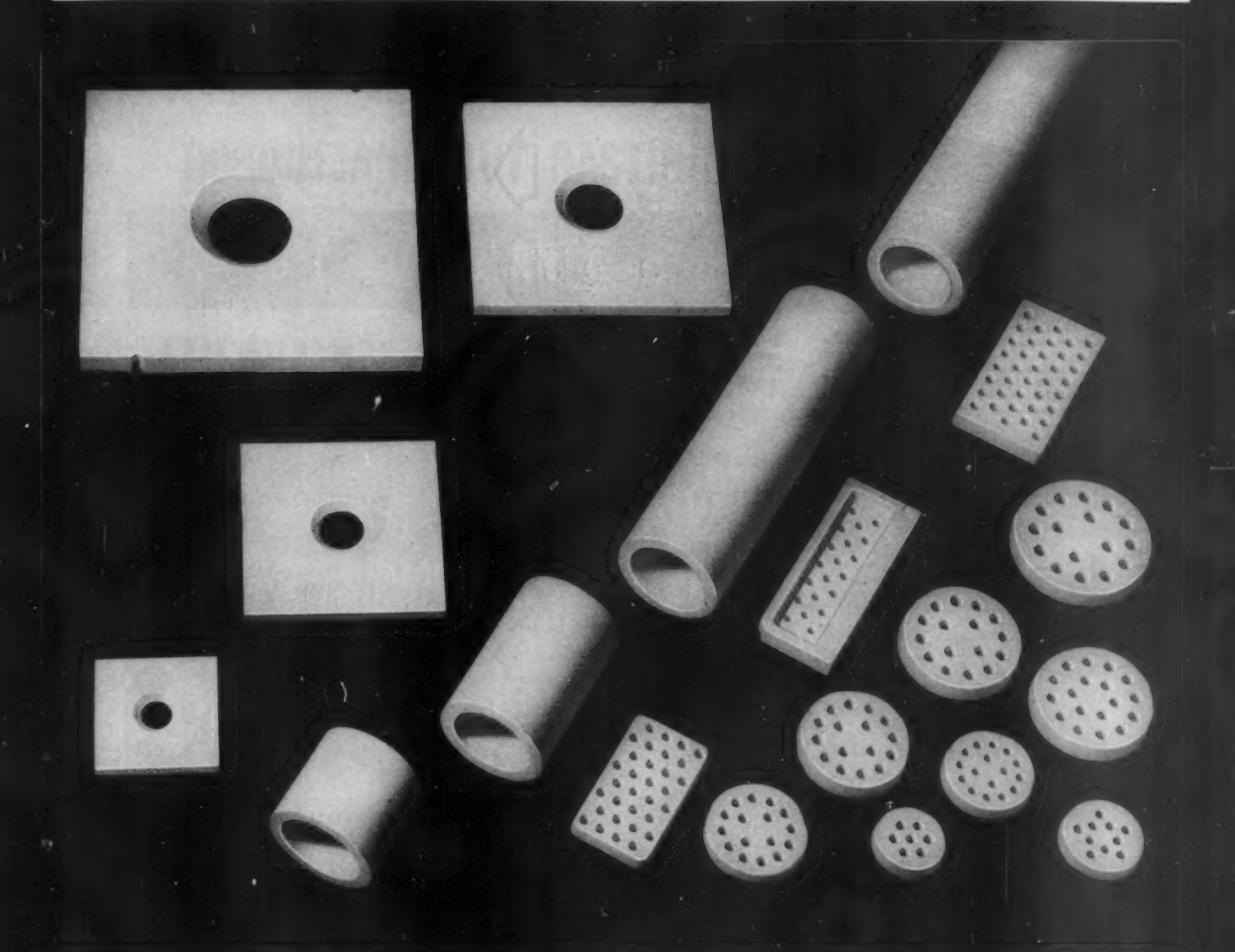
Management, Industrial and Plant Engineers

Member of the Association of Consulting Management Engineers, Inc.

549 W. Randolph St., Chicago 6, Ill.

New York Office—Lester B. Knight & Associates, Inc., Management Consultants, 500 Fifth Ave., New York 36
20111 James Couzens Highway, Detroit 35, Michigan
Knight Engineering Establishment (Vaduz), Zurich Branch, Dreikönigstrasse 21. Zurich, Switzerland
Lester B. Knight & Associates, G.M.B.H., Berliner Allee 47, Düsseldorf, Germany

Circle 575 on Page 55



what users like best about

Louthan gating and risering refractories . . .

There's a good reason why Louthan is making more and more refractories for the foundry field. *Users like them,* like the way they perform on the job, like the cost reductions they make possible.

Louthan Strainer Cores are now available in more sizes and shapes—and for *steel, iron, brass* and *bronze* castings. All provide an accurate choke for positive control of metal flow, eliminate slag and oxide inclusions.

Louthan Breaker Cores facilitate rapid removal of the riser with subsequent labor savings. There is no core gas. You get cleaner castings. Available for all riser diameters from 2″ to 12″, and for use with *any metal casting* riser from a flat surface.

Louthan Gate Tiles prevent erosion of the gates in steel castings. They safely withstand high temperatures, will not react with the molten metal. All popular diameters and lengths can be furnished, also elbows and tees to match.

FREE: Write for this new Louthan product booklet. You'll find that our products match your needs and perform the way you like them to.

FERRO CORPORATION

Refractories Division

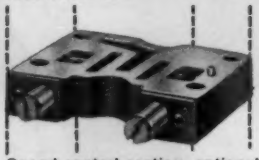
LOUTHAN PLANT . . . EAST LIVERPOOL, OHIO

REPRESENTATIVES: M. A. BELL COMPANY, St. Louis 2, Mo. . . Houston 3, Texas; **FOUNDRY SUPPLY COMPANY,** Minneapolis 16, Minn.; **MILWAUKEE CHAPLET & SUPPLY CORP.,** Milwaukee 46, Wisc. . . **FREDERIC B. STEVENS INC.,** Detroit 16, Mich. . . Indianapolis 7, Ind. . . Buffalo, N. Y.; **MISSOURI REFRACTORIES COMPANY,** 4599 Pacific Blvd., Los Angeles 58, California

Circle 574 on Page 55

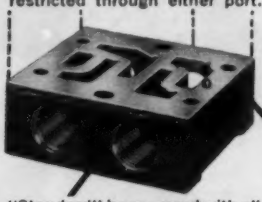
This basic CC body is the "heart" of every CC valve. Its one moving part is the "spool poppet", a Hannifin exclusive that seals bubble tight at either end of its short stroke. Note the ample air passages—all ¼" IPS or larger. This is single-actuator, spring return version.

This is the same body with double-end "spool poppet"—used when two actuators are required.

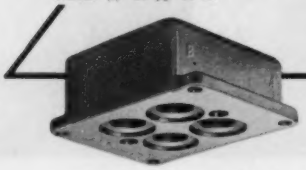


Speed control section, optional—designed to restrict exhaust flow, only, through either or both cylinder ports. Flow to the cylinder remains completely unrestricted through either port.

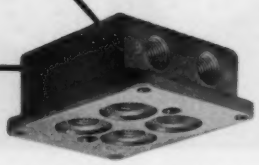
For foot-operated valves, the actuator is also the base, and this rear-ported adapter is used. Available tapped either ¼" or ⅜" IPS.



"Standard" base—used with all but foot-operated models. Every CC base is available tapped either ¼" or ⅜" IPS.



Optional base for "O" ring gasket mounting. Supplied complete with 4 O-rings.



"Universal" base, tapped from beneath and from both sides. Four pipe plugs supplied. Can also be used with O-rings.

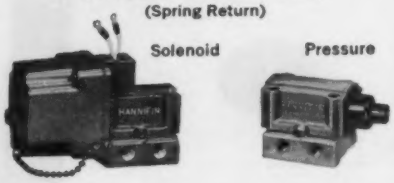
THESE QUICK-RESPONSE 4-WAY VALVES MOVE AIR DOWN THE LINE—FAST!

Hannifin CC valve design is the reason. Short, positive strokes of the "spool poppet" open up instant and ample passages for air.

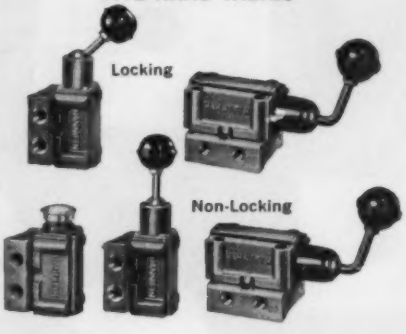
Actuation? Any way you want it!

One basic body with a wide selection of operating heads and bases—all with or without our new speed control section—give you over 3,000 choices. We can help you make the right choice . . . through our field engineering service. Call your nearest Parker-Hannifin office or write us direct for full information.

SINGLE ACTUATORS
(Spring Return)



FIVE HAND VALVES



TWO FOOT VALVES

TYPICAL COMBINATIONS
(Hundreds Available)

FOOT-OPERATED, LOCKING; PRESSURE OVER-RIDE —used on foundry machinery
CAM-OPERATED; PRESSURE-RETURN —used on automatic wash tanks
DOUBLE SOLENOID —used everywhere
PRESSURE-OPERATED; PRESSURE-RETURN —used everywhere

PARKER HANNIFIN CORPORATION

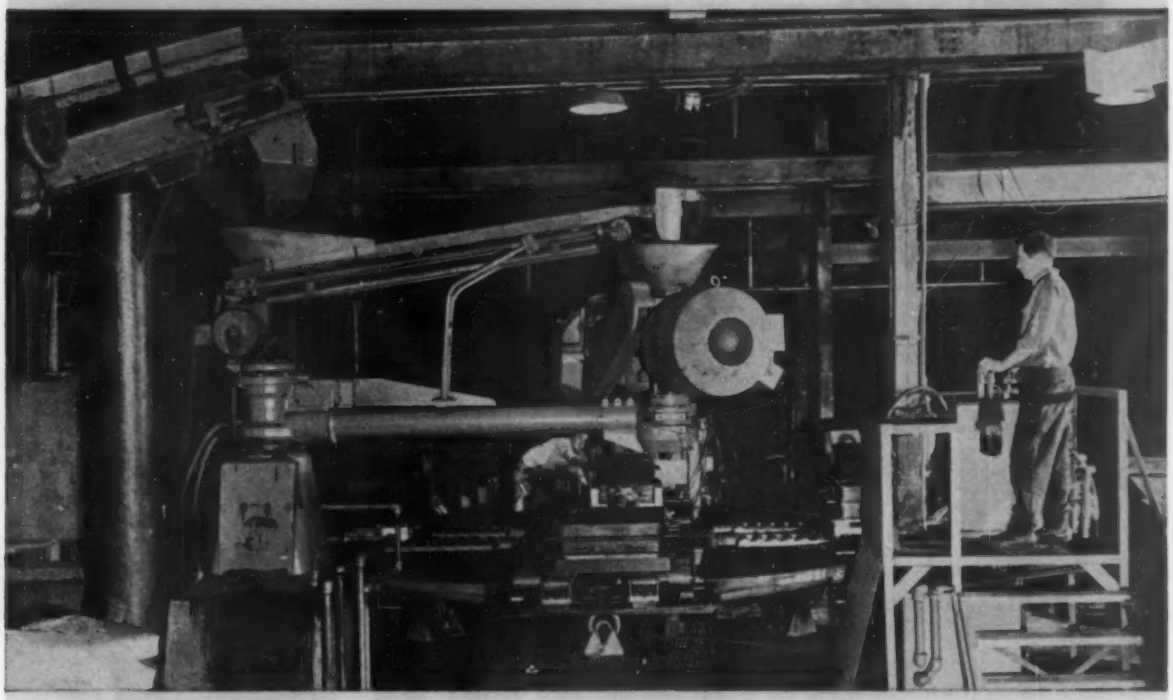
HANNIFIN COMPANY
A DIVISION
637 South Wolf Road • Des Plaines, Illinois
PNEUMATIC AND HYDRAULIC SYSTEM COMPONENTS

3138 PH.

GO OUT AND BUY CASTINGS?

BUILD A NEW PLANT?

MECHANIZE EXISTING PLANT?



BROWN & SHARPE'S CHOICE...

Inadequate foundry facilities left Brown & Sharpe, one of the world's outstanding machine tool producers, with only three courses. They would have to go out and buy castings from a jobbing foundry, build a new foundry, or completely revitalize their existing set-up through mechanization.

A staff of engineers studied the problem thoroughly. Because of the difficulties involved in developing new casting sources for their quantity and type of castings, a new foundry looked like the only way out, yet, management knew that the huge investment required would create a real overhead problem.

Then, the engineers investigated the tremendous flexibility and low cost of Hydra-Slinger mechanization. Mechanization of the existing foundry became the only logical course to follow. Now, Brown & Sharpe's largest molds—weighing up to five tons—are made on a Hydra-Slinger "Figure 9" Loop Conveyor Unit. Smaller work is handled on a Hydra-Slinger Roto-Mold Unit, served by a B&P Rol-A-Draw. An added assurance of quality and production is provided by a Model "60A" Speedmullor, which prepares the foundry's molding sand.

Brown & Sharpe's mechanization has paid off.

1. They avoided the huge investment required by a new plant.
2. Existing space and facilities have been utilized to provide all of the production needed.
3. The company has been able to obtain cost and control advantages by producing its own castings.

B&P mechanization can pay off in other ways, too. Write now!

BEARDSLEY & PIPER

Div. Pettibone Mulliken Corp.
2424 N. Cicero Avenue
Chicago 39, Illinois

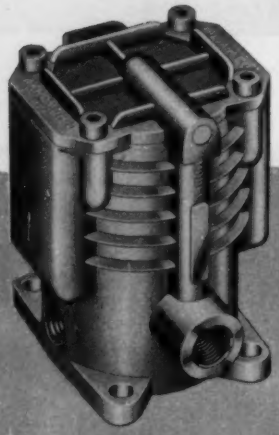
B&P

Circle 578 on Page 55

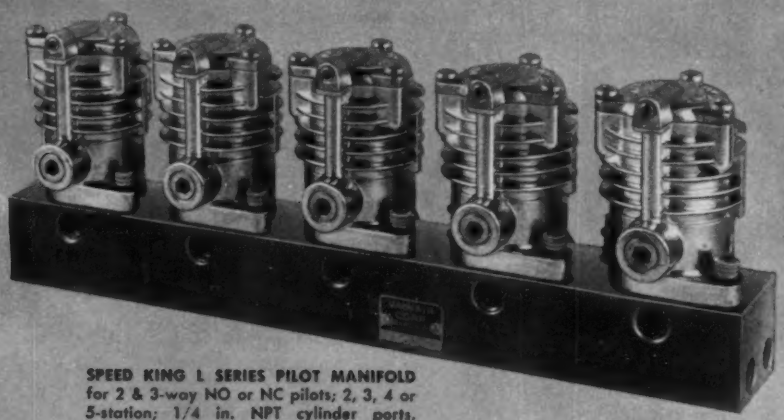
for dependable, economical control,
specify versatile...

SPEED KING®

SOLENOID PILOTS



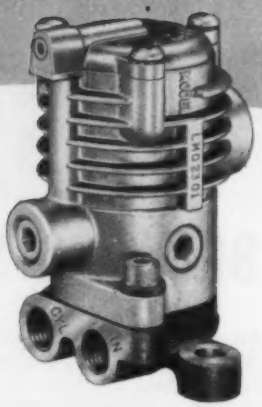
SPEED KING P SERIES PILOT 2 & 3-way NO & NC, 4-way; foot, sub-base or manifold mounting; 1/8 or 3/16 in. orifices. Foot mounting shown.



SPEED KING L SERIES PILOT MANIFOLD for 2 & 3-way NO or NC pilots; 2, 3, 4 or 5-station; 1/4 in. NPT cylinder ports. 5-station shown.

Compact Valvair® SPEED KING pilots are ideal for control of small air or vacuum-operated devices including cylinders up to 3 in. bore, as well as for piloting larger valves. Featuring Valvair's flow-thru cooling design, they offer multi-million cycle dependability, with solenoid coils guaranteed against burn-out for the life of the valve. Choose from a full range of types, mounting styles and sizes; integral junction boxes (L Series only) and manual over-ride optional; coils for ac or dc, any voltage.

Solve your small unit control problems with SPEED KING solenoid pilots. Your Valvair or Bellows Field Engineer can recommend a size and type exactly suited to your requirements.



SPEED KING L SERIES PILOT 2 & 3-way NO & NC; foot, sub-base or manifold mounting; 1/16 to 1/8 in. orifices. Sub-base mounting shown.

Bellows-Valvair

AKRON 9, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

9112-3

Bellows-Valvair

Write for free Bulletin PIL. Address: Bellows-Valvair, Akron 9, Ohio. Dept. FO-1160.

Circle 579 on Page 55

Late News

OUTLOOK: Confused about the business outlook? If you are, you have plenty of company among the country's economists. Rarely if ever have their views been so divergent as they are today. Some think we have been in a recession for a number of months; some feel that it started only recently and will extend well into 1961; another group believes that the lag in durable goods has merely tended to slow general activity without causing the economy to stumble seriously.

Martin R. Gainsbrugh, chief economist, National Industrial Conference Board, subscribes to the last belief. He offers as support the facts that 1) the index of industrial production in September of 109 compares with the 1959 peak of 110 despite drops of 5.5 per cent in durables manufacture and 29.5 per cent in primary metals, 2) gross national product actually has risen steadily through the first three quarters when effects of inventory additions in the first half are deducted, and 3) employment and personal income have reached record levels.

NFFS MEETS: Non-Ferrous Founders' Society, during its annual meeting Oct. 12-15 at Asheville, N. C., laid the groundwork for an ambitious educational-promotional program to increase the use of copper, brass, and bronze castings. The immediate program involves preparation of talks for NFFS members on new processes and developments in the industry. Other talks on the advantages and uses of copper-base alloy castings will be prepared for presentation to schools and technical and engineering groups.

Publication and distribution of a book on

Foundry Statistics

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap Total	By Types of Furnace — Cupola Total	Air Total	Electric Total
1958	50,242,746	7,725,970	821,388	7,152,726
1959				
June	6,322,404	885,497	104,653	997,921
6 mo.	37,320,295	5,113,635	587,742	5,557,649
July	3,584,931	750,206	87,441	603,726
Aug.	1,875,185	691,786	81,184	374,678
Sept.	2,114,015	801,588	90,090	441,134
Oct.	2,266,709	798,569	98,279	445,137
Nov.	4,796,896	614,233	82,784	801,555
Dec.	7,021,870	843,040	99,577	1,008,158
Total	58,979,881	9,613,659	1,156,097	9,232,057
1960				
Jan.	7,043,488	823,442	95,442	1,058,189
Feb.	6,493,556	822,476	97,685	1,015,716
Mar.	6,655,589	839,016	106,749	974,535
Apr.	5,625,717	754,486	82,767	787,186
May	5,051,121	771,800	79,170	652,585
June	4,485,444	809,297	87,485	633,797
6 mo.	35,354,897	4,820,517	549,301	5,121,978

Index of Foundry Equipment Orders

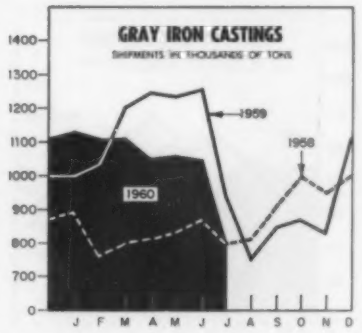
Foundry Trades Only

(Net Orders Closed, New Equipment)

	1959	1960
Jan.	127.4	95.5
Feb.	237.1	128.6
Mar.	166.6	159.9
Apr.	154.2	97.9
May	157.0	159.0
June	125.1	164.8
July	110.7	80.0
Aug.	134.1	92.4
Sept.	131.3	....
Oct.	140.8	....
Nov.	131.2	....
Dec.	95.9	....

Note: Base period 1947-49 taken as 100 per cent monthly average.

Source: Foundry Equipment Manufacturers Association.



GRAY IRON CASTINGS—SHIPMENTS

(Net tons*)

	All Castings — Total	All Castings — For Sale	Miscellaneous Castings Total	Miscellaneous Castings For Sale	Nodular Iron Castings Total	Heavy Steel Ingot Molds Total	Chilled Railroad Car Wheels Total	Pressure Pipe & Fittings Total[3]	Soil Pipe & Fittings Total[3]	Unfilled Orders[3]
1958	10,357,504	5,849,426	6,146,186	2,648,005	117,558	1,384,396	265,114	1,277,685	784,123	.....
1959										
July	932,040	532,238	599,127	252,619	14,983	99,670	20,486	133,175	79,582	897,436
7 mo.	7,903,555	4,338,830	4,704,426	1,913,955	100,133	1,630,177	218,229	824,429	526,284	.....
Aug	742,420	505,612	484,678	253,466	11,046	13,482	18,479	145,853	79,928	872,993
Sept.	848,839	527,001	584,669	278,591	11,875	19,416	16,272	142,660	75,882	883,278
Oct.	870,635	519,178	621,833	277,161	17,797	20,155	19,647	139,716	69,284	886,970
Nov.	830,360	514,888	492,742	249,576	12,698	165,139	16,723	96,086	59,670	885,368
Dec.	1,106,796	583,571	649,200	270,276	14,651	294,129	20,595	92,139	50,733	845,578
Total	12,301,781[4]	6,988,199	7,546,664	3,242,144	167,312	2,142,498	309,945	1,440,883	861,791	.....
1960										
Jan.	1,135,575	591,504	677,392	277,100	16,774	295,994	18,463	86,798	56,928	851,336
Feb.	1,107,721	571,143	678,927	279,190	16,430	284,738	17,843	76,332	49,576	855,324
Mar.	1,143,396	600,162	655,102	284,207	15,670	294,322	24,409	83,121	56,441	880,132
Apr.	1,051,357	580,590	609,234	258,994	13,980	232,895	21,737	118,886	68,605	834,495
May	1,052,798	588,770	613,745	257,180	13,126	207,094	20,414	136,455	75,090	781,596
June	1,049,638	601,597	622,236	273,148	15,010	183,049	19,810	144,773	79,770	719,564
July	803,306	450,580	478,269	202,347	10,694	120,784	16,226	120,650	67,375	754,789
7 mo.	7,343,790	4,573,005	4,364,905	1,832,166	101,684	1,618,876	138,907	767,015	454,085	.....

*Source: U. S. Dept. of Interior Bureau of Mines. [2]Source: Bureau of Census. [3]For sale only. [4]All cast iron pipe is shipped for sale. [4]Gray iron total includes nodular iron.

Late News

the design, purchase, and use of copper-base alloy castings also was approved by the board of directors.

The society's Distinguished Service Award was presented to Chester K. Faunt, president, Faunt Foundry Co., Chicago, for his contributions to the advancement of the industry.

New officers elected by the society are: President—Elmer G. Brumund Jr., Brumund Foundry Inc., Chicago; first vice president—Dan A. Mitchell, Progressive Brass Mfg. Co., Tulsa, Okla., and second vice president—Lawrence J. Andres, Lawran Foundry Co., Milwaukee.

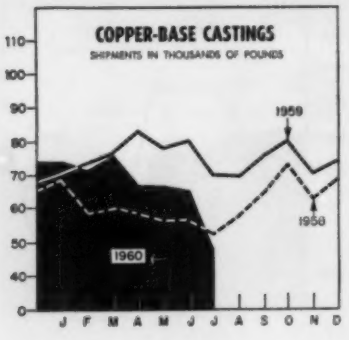
TRENDS: The Material Handling Institute's Monthly Bookings Index for August was 131.33. That is nearly six points over the dollar volume of orders reported by industrial material handling equipment manufacturers for July. Bookings in the material handling industry for the first eight months of the year are about 1.7 per cent off the level recorded during the same period in 1959 . . . Primary aluminum production for September was 162,882 tons compared with 172,973 tons for August and 168,205 tons for September, 1959. Production for the first nine months of 1960 was 1,520,772 compared with 1,462,615 tons for the same period in 1959.

FEMA ELECTS: The Foundry Equipment Manufacturers Association at its annual meeting Oct. 20-22 at the Greenbriar, White Sulphur Springs, W. Va., re-elected the following officers: President—E. A. Borch, National Metal Abrasive Co., Cleveland; first vice president—R. A. Brackett, Spencer Turbine Co., Hartford, Conn.; and second vice president—C. G. Hawley, Jeffrey Mfg. Co., Columbus, Ohio.

ALUMINUM IN CARS: In its annual survey of aluminum applications on 1961 model automobiles, Kaiser Aluminum & Chemical Corp. estimates a per car increase of 14.2 per cent. That follows a ten-year trend of annual increases from 10 to 15 per cent.

OBITUARY: Robert J. Harvey, former president, Illinois Precise Casting Co., Chicago, died Oct. 2 . . . Arthur O. Spoeneman, sales manager, Taylor & Boggis Foundry Co., Cleve-

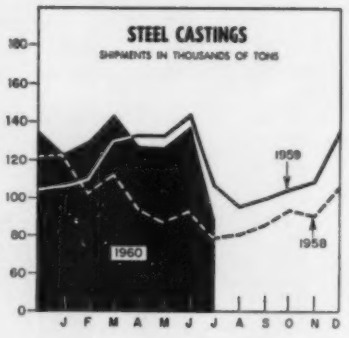
Foundry Statistics



COPPER-BASE CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments			
	Total	Sand	Perm. Mo'd	Unfilled Orders[2]
1958	762,484	697,360	31,854	.....
1959				
July	66 625	59,254	3,817	31,520
7 mo. ..	514,491	455,022	29,093	.....
Aug.	66,531	57,949	4,359	32,117
Sept.	73,290	63,813	4,758	29,396
Oct.	77,385	67,186	5,120	28,092
Nov.	68,255	59,094	4,840	29,147
Dec.	71,110	62,182	4,286	29,243
Total ..	871,032	765,246	52,456	.....
1960				
Jan.	73,971	65,742	3,915	26,053
Feb.	71,797	63,103	4,146	26,970
Mar.	75,908	66,517	4,346	27,470
Apr.	66,777	58,453	4,523	27,423
May	66,299	57,848	4,463	24,582
June	64,585	56,441	3,715	21,781
July	48,471	42,778	2,910	22,367
7 mo. ..	467,808	410,882	28,118	.....



STEEL CASTINGS—SHIPMENTS

(Net tons[1])

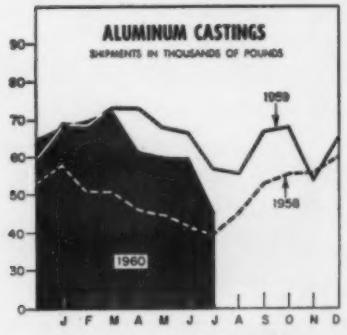
	All Castings			Carbon			Alloy			
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Unfilled Orders[2]
1958	1,121,000	856,986	149,644	801,846	606,240	136,251	319,154	250,746	13,393	.....
1959										
July	106,448	83,540	16,007	77,990	60,501	14,520	28,458	23,039	1,487	274,065
7 mo.	866,764	678,503	136,951	634,715	494,807	126,031	228,789	183,692	9,930	.....
Aug.	98,014	79,188	17,607	74,825	60,243	16,373	23,189	18,945	1,234	279,261
Sept.	99,731	79,963	13,975	73,648	58,453	12,830	26,083	21,510	1,145	256,871
Oct.	105,570	84,850	11,819	80,127	63,901	10,978	25,443	20,108	841	268,874
Nov.	109,469	86,026	11,764	77,320	59,294	10,799	32,240	26,732	965	301,858
Dec.	133,346	104,138	15,868	99,643	77,517	17,200	33,703	26,621	1,668	306,346
Total	1,412,885	1,112,668	210,984	1,043,538	814,219	194,201	369,347	298,449	16,783	.....
1960										
Jan.	122,565	94,052	22,016	93,197	70,815	20,891	29,368	23,237	1,125	314,237
Feb.	129,259	97,927	26,532	96,888	72,963	25,328	32,371	24,964	1,204	279,684
Mar.	143,708	109,688	27,801	104,742	78,755	26,365	38,966	30,933	1,436	277,982
Apr.	127,219	96,557	26,101	93,433	70,251	24,526	33,786	26,306	1,575	245,902
May	126,589	97,231	26,793	93,700	71,808	25,324	32,880	25,423	1,469	252,293
June	136,992	107,076	29,155	101,294	78,601	27,503	35,698	28,475	1,652	233,765
July	89,565	67,294	16,196	63,753	47,570	15,570	25,812	19,724	626	223,880
7 mo.	875,888	669,825	174,624	647,007	490,763	165,507	228,881	179,062	9,117	.....

[1]Source: Bureau of the Census. [2]For sale only.

land, died Oct. 7 . . . Forrest J. Gartside, president, Diamond Clamp & Flask Co., Richmond, Ind., died Oct. 7 . . . Edwin N. Hanlon, engineering consultant, Newaygo Engineering Co., Newaygo, Mich., died Oct. 7.

PERSONALS: Clifford M. Apgar has been named manager of shop operations at the General Electric Co. Specialty Foundry, Schenectady, N. Y. He formerly was works manager and vice president of operations at Adirondack Foundries & Steel Inc., Watervliet, N. Y. . . . Donald Fosnaugh has been appointed controller, Superior Foundry Inc., Cleveland . . . Carl Kilian has been named a sales engineer for Albert Lea Foundry of Queen Products Div., King Seeley Corp., Albert Lea, Minn. . . . National Malleabble & Steel Castings Co., Cleveland, has appointed as sales managers, Lucien Williams for the St. Louis office, and Glenn G. Tenney for the Philadelphia office . . . Joseph H. McGraw has been appointed Eastern district manager with offices in New York for Vanadium Corp. of America. He formerly was Detroit district manager where he is succeeded by Daniel A. Hackett . . . Martin N. Lindsay has been made responsible for sales of coke and pig iron for Crucible Steel Co. of America, Pittsburgh . . . Robert S. Reimers has been appointed a technical sales representative, Foundry Services Inc., Cleveland . . . Norton Co., Refractories Div., Worcester, Mass., has named James L. Miller a refractories engineer in San Francisco. Formerly of Chicago, he is succeeded there by John A. Trogolo. Robert T. Hale was made refractories engineer in Indianapolis.

MISCELLANY: Superior Foundry Inc., Cleveland, is planning to consolidate about Dec. 1 the operations of its Allyne-Ryan Foundry Div. into the Superior plant. Temporary "mothballing" of the Allyne-Ryan plant is contemplated . . . Siebers & Raisch Pattern Works, Milwaukee, on Oct. 16 suffered fire damage estimated at $35,000 . . . West Steel Casting Co., Cleveland, has shut down its two foundries operated in that city . . . Cleveland Malleable Iron Corp., Cleveland, formerly Lake City Malleable Iron Co., has been taken over from Morrison Industries by new owners with Charles Holland as president.



PRODUCTION WORKERS

Estimated Number

	July 1960	June 1960	July 1959
Ferrous	187,100	193,100	197,700
Nonferrous	48,000	50,300	52,500

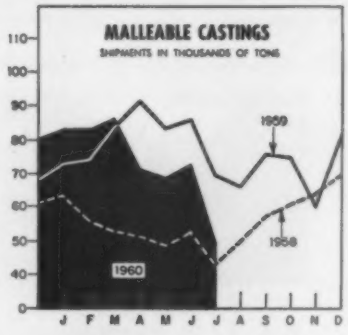
Average Weekly Earnings

Gray Iron	96.68	96.43	97.51
Malleable Iron	92.88	91.96	95.82
Steel	103.36	103.62	103.38
Nonferrous	101.40	101.91	99.55

Average Weekly Hours

Gray Iron	39.3	39.2	40.8
Malleable Iron	38.7	38.0	40.6
Steel	39.3	39.7	40.7
Nonferrous	40.4	40.6	40.8

Source: Bureau of Labor Statistics.



ALUMINUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1958	641,700	125,487	224,092	290,275	.....
1959					
July	57,048	11,526	20,687	24,701	80,450
7 mo.	476,489	82,632	175,952	217,061	.....
Aug.	56,041	11,074	18,102	26,733	82,488
Sept.	66,331	12,254	21,783	32,154	81,839
Oct.	67,635	12,902	22,058	32,555	78,930
Nov.	54,695	10,757	16,604	27,219	84,392
Dec.	65,208	12,368	20,356	32,379	86,947
Total	786,399	141,987	274,855	368,101	.....
1960					
Jan.	68,247	11,278	22,368	34,514	92,109
Feb.	71,699	11,800	23,614	36,177	83,914
Mar.	72,216	12,934	22,413	36,749	78,024
Apr.	61,797	12,339	19,950	29,400	75,243
May	60,330	10,682	21,507	28,055	75,977
June	60,068	11,280	20,953	27,722	74,699
July	45,669	8,735	15,804	20,978	76,683
7 mo.	440,026	79,048	146,609	213,665	.....

[1]Source: Bureau of the Census. [2]For sale only.

MALLEABLE IRON CASTINGS

(Shipments of castings—net tons[1])

	Shipments Total	For Sale	Standard Total	For Sale	Pearlitic Total	For Sale	Unfilled Orders[2]
1958	660,650	383,839	540,600	313,597	120,050	70,242	.....
1959							
July	69,184	43,128	55,120	35,787	14,064	7,341	75,252
7 mo.	561,408	333,914	444,353	270,143	117,055	73,771	.....
Aug.	65,062	40,143	53,217	33,224	11,845	6,919	85,852
Sept.	76,063	46,469	60,209	36,619	15,854	9,850	82,274
Oct.	75,511	48,625	61,683	40,088	13,828	8,537	85,031
Nov.	58,258	42,235	48,951	33,981	9,307	8,254	82,555
Dec.	80,060	45,917	61,455	35,891	18,605	10,026	93,874
Total	916,362	557,303	729,868	449,946	186,494	107,357	.....
1960							
Jan.	83,188	46,154	63,637	35,933	19,551	10,221	100,302
Feb.	83,118	46,850	64,131	37,391	18,987	9,459	98,272
Mar.	86,243	49,907	67,448	40,422	18,795	9,485	84,679
Apr.	71,271	39,059	56,136	32,066	15,135	6,993	79,237
May	68,942	37,618	53,108	30,126	15,834	7,492	73,240
June	72,593	43 105	55,956	34,526	16,637	8,579	63,920
July	49,860	28,575	37,187	22,477	12,673	6,098	74,329
7 mo.	511,215	291,268	397,603	232,941	117,804	58,327	.....

Prices of Foundry Metals and Coke

(As of October 24, 1960)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$18.00-$18.50

OVEN

Birmingham	$30.35
Buffalo	32.00
Detroit	32.00
Erie, Pa.	32.00
Indianapolis	31.25
Kearney, N. J.	31.25
Milwaukee	32.00
Neville Island (Pittsburgh)	30.75
New England, deld.	33.55
New Haven, Conn.	31.00
Painesville, O.	32.00
Philadelphia	31.00
St. Louis	33.00
St. Paul	31.25
Swedeland, Pa.	31.00
Terre Haute, Ind.	31.25

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Boston, deld.	77.79	78.29
Buffalo	66.50	67.00
Chester, Pa.	Nom.	Nom.
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.49	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, cariots)

BRASS AND BRONZE: Red brass, No. 115, 29.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high-leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 23.50; manganese bronze, No. 421, 27.50.

ALUMINUM: Primary alloy No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80. Secondary No. 12 alloy, 22.75. Deoxidizing grades: No. 1, 23.75; No. 4, 21.00.

MAGNESIUM ALLOY: AZ91A, 40.75; AZ63A, AZ92A, AZ91C, 40.75, f.o.b. Velasco, Tex.

COPPER: Electrolytic 30.00, delivered Connecticut valley.
ZINC: High grade 14.35, delivered. Die casting alloy No. 3, 16.25; No. 2, 16.75, delivered.

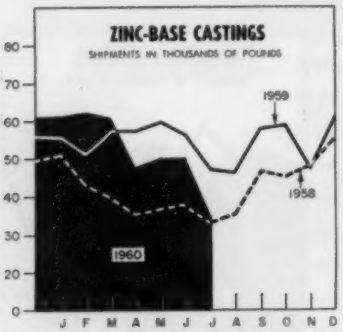
Iron and Steel Scrap

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Machinery Cast	Structurals, Plate	Malleable	Short Steel Rails
Birmingham	$30.00-31.00	$46.00-47.00	.....	.....	$36.00-37.00	.....	$45.00-46.00
Boston*	**24.00-25.00	**39.00-40.00	.....	**40.00-42.00	.....	.....	.....
Buffalo	27.00-28.00	**39.00-40.00	.....	**46.00-47.00	35.00-36.00	.....	**45.00-46.00
Chicago	29.00-30.00	36.00-37.00	.....	41.00-42.00	30.00-31.00	40.00-41.00	42.00-44.00
Cincinnati*	**24.50-25.50	**36.00-37.00	**29.00-30.00	**46.00-47.00	.....	.....	**46.00-47.00
Cleveland	25.00-26.00	40.00-41.00	26.00-27.00	44.00-45.00	32.00-33.00	45.00-46.00	46.00-48.00
Detroit*	**21.00-22.00	**31.00-32.00	**25.00-26.00	.....	.....	.....	.....
Los Angeles	30.00	39.00-44.00	.....	.....	44.00	.....	.....
New York*	30.00-31.00	36.00-37.00	30.00-31.00	.....	33.00-34.00	.....	.....
Philadelphia	34.00	39.00	38.00	48.00-49.00	38.00-40.00	46.00	48.00-50.00
Pittsburgh	28.00-29.00	36.00-37.00	.....	47.00-48.00	33.00-35.00	.....	48.00-50.00
St. Louis*	30.00	40.00	33.00	.....	.....	.....	39.00
San Francisco	32.00	46.00-48.00	28.00	45.00-46.00	40.00	.....	.....
Seattle	38.50	35.00	36.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Foundry Statistics



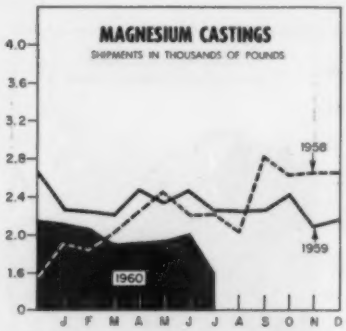
PIG IRON

PRODUCTION*—Net Tons

	Foundry	Malleable & Silvery	Low & Int. Low Phos. & Bessemer
1958	1,622,320	2,448,917	4,954,854
1959			
Aug.	N.A.	N.A.	N.A.
Sept.	N.A.	N.A.	N.A.
Oct.	N.A.	N.A.	N.A.
Nov.	148,660	180,927	216,063
Dec.	177,017	306,303	452,426
Totals[3]	1,889,445	2,810,359	3,471,583
1960			
Jan.	128,232	325,151	462,667
Feb.	148,238	338,866	471,755
Mar.	126,357	333,182	462,914
April	134,509	258,452	395,875
May	135,825	290,057	356,931
June	105,717	247,991	309,942
July	117,218	166,084	290,384
Aug.	78,950	171,718	211,506
8 mo.	975,046	2,134,223	2,961,974

CONSUMPTION*—Gross Tons

	Cupola	Air	Electric
1958	3,314,652	169,267	231,145
1959			
June	366,136	20,390	39,867
6 mo.	2,090,869	118,509	238,937
July	311,327	16,391	20,437
Aug.	288,547	15,937	4,923
Sept.	336,015	18,057	6,033
Oct.	351,679	20,011	5,749
Nov.	276,168	16,350	28,231
Dec.	334,524	18,613	47,045
Total	3,989,129	223,868	351,355
1960			
Jan.	328,242	18,634	45,936
Feb.	322,945	19,257	42,883
Mar.	317,520	21,042	43,959
Apr.	282,178	16,796	36,971
May	292,407	15,730	19,869
June	313,340	16,828	23,720
6 mo.	1,856,632	108,287	213,338



ZINC-BASE CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1958	500,071	319,471	.....
1959			
July	44,646	32,497	52,677
7 mo.	370,506	258,954	.....
Aug.	44,456	32,573	56,090
Sept.	56,035	38,283	60,959
Oct.	57,106	40,487	57,514
Nov.	44,611	35,301	55,076
Dec.	58,496	37,406	65,723
Total	631,210	443,009	.....
1960			
Jan.	61,537	39,777	64,940
Feb.	62,925	42,089	66,945
Mar.	60,816	39,618	60,267
Apr.	47,553	31,423	56,312
May	50,844	33,551	56,654
June	50,809	34,264	51,960
July	35,117	25,186	52,392
7 mo.	369,601	245,908	.....

MAGNESIUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1958	28,776	25,024	.....
1959			
July	2,254	1,865	3,995
7 mo.	16,174	14,326	.....
Aug.	2,233	1,742	3,809
Sept.	2,253	1,822	3,823
Oct.	2,426	1,880	3,501
Nov.	2,013	1,618	3,281
Dec.	2,154	1,721	3,423
Total	27,253	23,109	.....
1960			
Jan.	2,135	1,588	3,209
Feb.	2,075	1,679	3,278
Mar.	1,903	1,524	3,208
Apr.	1,926	1,533	3,138
May	1,953	1,514	2,948
June	2,050	1,555	3,396
July	1,638	1,234	3,541
7 mo.	13,680	10,627	.....

*Source: U. S. Dept. of Interior Bureau of Mines: ** Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Monthly figures do not add up to totals shown because of unreported monthly revisions.

NOW YOU CAN BUY DORCHESTER MC* SAND MULLED

CAN'T FREEZE

SAVES MONEY

READY TO USE

Muller of new design manufactured by National Engineering Company

Another first! Whitehead's new plant at Dorchester. View shows how sands are processed and loaded on freight cars by equipment of latest design.

WHITEHEAD'S

*MOISTURE CONTROLLED AND MULLED

NATURAL BONDED

DORCHESTER MOLDING SANDS AND GRAVELS

Guaranteed Moisture Content Not Above 6%

With Whitehead's new plant in full operation, Dorchester Molding Sands arrive at your foundry completely mulled, if so ordered. Each grain of sand is evenly coated with its natural bond of clay.

Widely used for Cores and Molds in Iron, Steel, Alloys, and Non-Ferrous Castings, the famous Dorchester Molding Sands are noted for Colloidal clay giving high green and dry strength. Because of the low fines in grain distribution, these sands have a high permeability.

1 ***Moisture Controlled Sands Do Not Freeze—***

a. Easier to unload . . . means lower unloading costs.

b. Reduces handling costs to and from storage bins.

2 ***Moisture Controlled Sands Are Economical—***

a. Sand with 15% moisture have 1700 lbs. sand and 300 lbs. water in each ton.

b. Moisture Controlled Sands with 6% moisture have 1880 lbs. sand and 120 lbs. water in each ton.

c. On each ton of Moisture Controlled Sands you SAVE price of sand and freight on 180 lbs. of water. Sand has just right amount of moisture to eliminate dust hazard.

3 ***Ready to Use on Arrival at Foundry—***

a. Dorchester Moisture Controlled Sands and Gravels arrive with proper working moisture content so that they can be used at once.

b. Aids you in control for sand at foundry.

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Established 1841

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Manufacturers of:

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Ready-to-use core paste

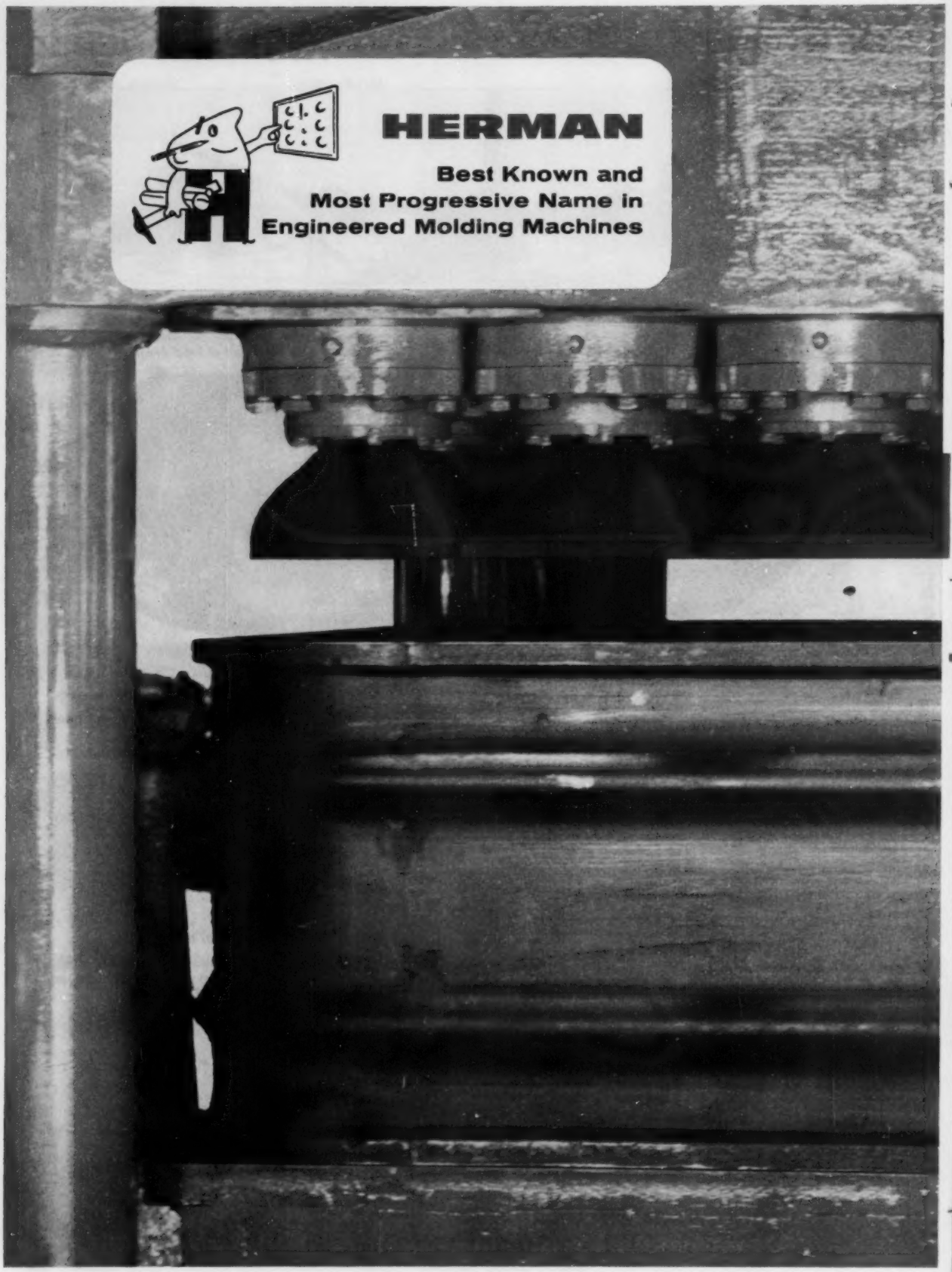
DOB-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

Circle 580 on Page 55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Best Known and
Most Progressive Name in
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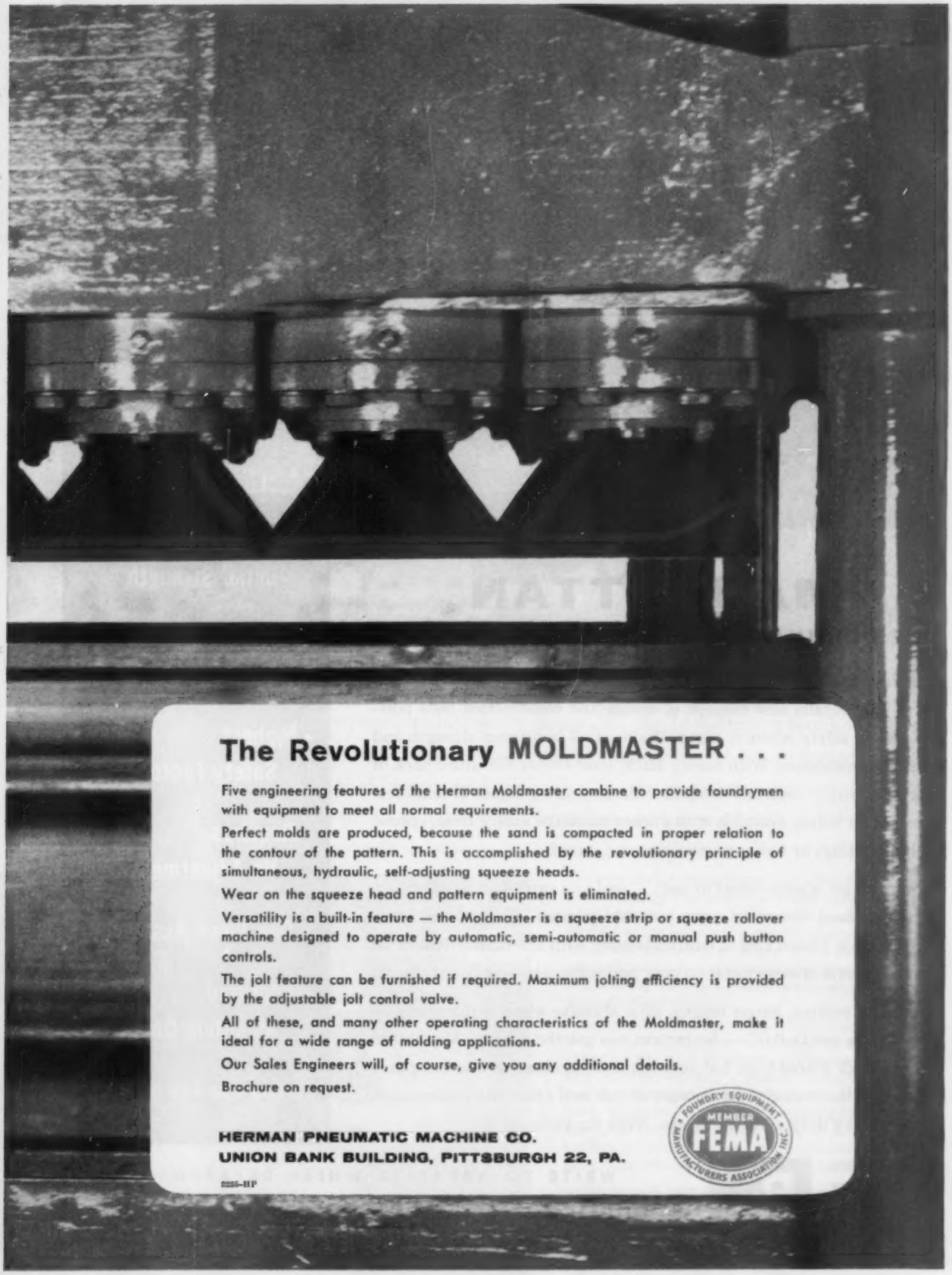

The Revolutionary MOLDMASTER . . .

Five engineering features of the Herman Moldmaster combine to provide foundrymen with equipment to meet all normal requirements.

Perfect molds are produced, because the sand is compacted in proper relation to the contour of the pattern. This is accomplished by the revolutionary principle of simultaneous, hydraulic, self-adjusting squeeze heads.

Wear on the squeeze head and pattern equipment is eliminated.

Versatility is a built-in feature — the Moldmaster is a squeeze strip or squeeze rollover machine designed to operate by automatic, semi-automatic or manual push button controls.

The jolt feature can be furnished if required. Maximum jolting efficiency is provided by the adjustable jolt control valve.

All of these, and many other operating characteristics of the Moldmaster, make it ideal for a wide range of molding applications.

Our Sales Engineers will, of course, give you any additional details.

Brochure on request.

HERMAN PNEUMATIC MACHINE CO.
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2235-HP

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

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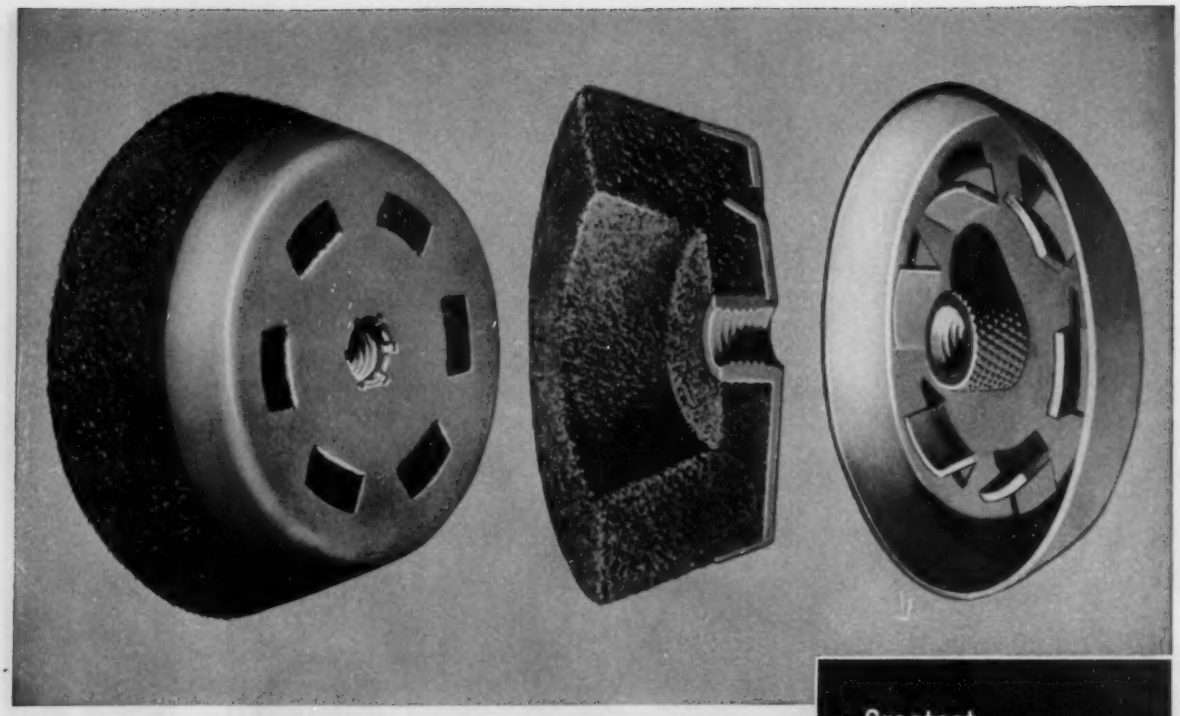

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The first wheel to offer the exclusive features of the Safety Back Flared Cup! This totally new concept of design *and* construction puts portable wheel *safety* where it counts the most — in *original* strength and breakage resistance! With Safety Back, steel covers the entire back of the flared cup . . . extends down the side to assure a degree of reinforcement never before available with anchor bushings, safety rings, special hub mountings or ordinary revolving cup guards.

You can't get a safer wheel to use . . . and you can't find a better performing wheel to use on your portable grinders. Every Manhattan Safety Back Flared Cup is custom-bonded with the right abrasive for *faster* removal of *more* metal on your particular job — at no extra cost!

For faster cutting, longer lasting, *safer* abrasive wheel performance — "More Use per Dollar" — be certain you get the original Manhattan Safety Back Flared Cup. Let your Manhattan abrasive wheel engineer show you the exclusive advantages of this and other Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

- Greatest Initial Strength
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WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION • PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Circle 582 on Page 55

Circle 583 on Page 55→

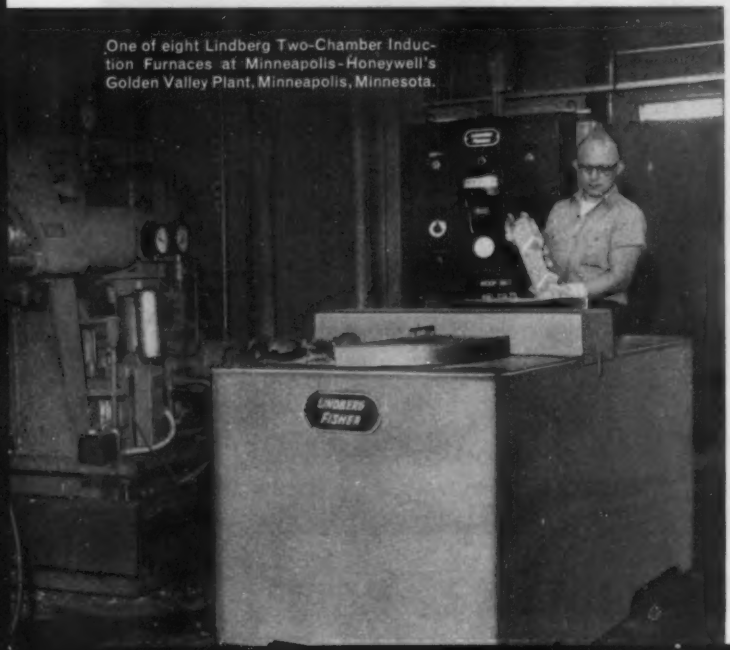
ART GEORGE has a good word to say for Lindberg Melting Furnace performance

QUOTE

Mr. Art George, Senior Production Engineer, Golden Valley Plant, Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

"Our installation of eight* Lindberg-Fisher Two-Chamber Induction Melting and Holding Furnaces has given remarkable service for more than four years. In this period, with the help of a well executed Honeywell maintenance program, the installation has been unusually trouble-free. Only one of the eight furnaces has required relining over this long period. Handling more than 1,000,000 pounds of aluminum and zinc annually, the installation has unfailingly provided the consistently high quality of metal our precision instruments require."

**Altogether, 44 Lindberg Furnaces are in operation in various Honeywell plants.*



One of eight Lindberg Two-Chamber Induction Furnaces at Minneapolis-Honeywell's Golden Valley Plant, Minneapolis, Minnesota.

These eight Lindberg-Fisher Induction Furnaces melt and hold aluminum and zinc for die casting gas valve housings and other component parts. They are located at the die casting machines where ingot and scrap can be melted and held at the desired casting temperature in one convenient unit. Magnetic fluxing and stirring insures uniform temperatures and consistently clean metal.

In any production process where aluminum needs heat there is Lindberg equipment to apply it most economically and efficiently. Furnaces for melting and holding, casting stations, re-melting or heat treating are available in all capacities, electric or fuel fired. Get in touch with your Lindberg Field Engineer (see your classified phone book) or write us direct. Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard St., Chicago 12, Illinois.

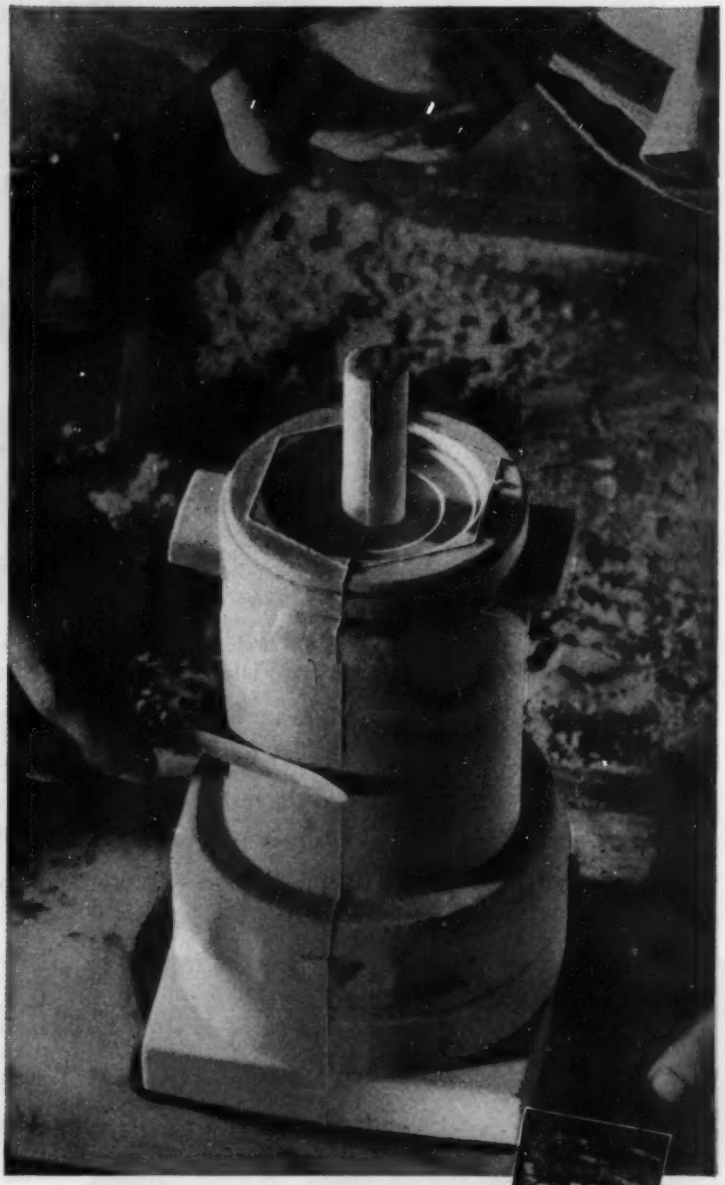
Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, South Africa, Spain, Switzerland and West Germany.

LINDBERG
heat for industry

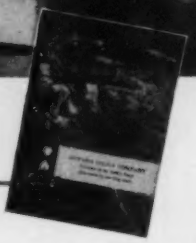
OTTAWA Round-Grain SILICA

...BETTER 4 WAYS

- Excellent flowability
- Low bond requirements
- High permeability
- Cleans easily–no breakdown during reclamation



Write today for your free copy of OTTAWA'S new brochure



Serviced by truck, barge and two main trunk railway systems, Ottawa Silica offers fast delivery to all corners of the nation.

OTTAWA SILICA COMPANY

PLANTS LOCATED IN
OTTAWA, ILL. ROCKWOOD, MICH.
CONNECTICUT AND CALIFORNIA

Circle 584 on Page 55

FOUNDRY VENTILATION *by* SCHNEIBLE

Features Compensating Air for Building Ventilation Balance

Schneible engineers designed Compensating Air Hoods to provide more and better ventilation in foundries, both summer and winter. The Compensating feature confines air patterns to the immediate work area, thus no drafts to annoy workers or disturbance of building ventilation balance. In summer, hot air can be scavenged from the roof area thus providing more comfortable working conditions. During winter months supply air is taken from outside the building conserving needed plant warm air. In both cases the balance of building air is maintained.

A Schneible Compensating Air Hood System allows complete regulation of all foundry air, with the result that savings are made in power plant operation in winter, while providing the most comfortable working atmosphere in all seasons.

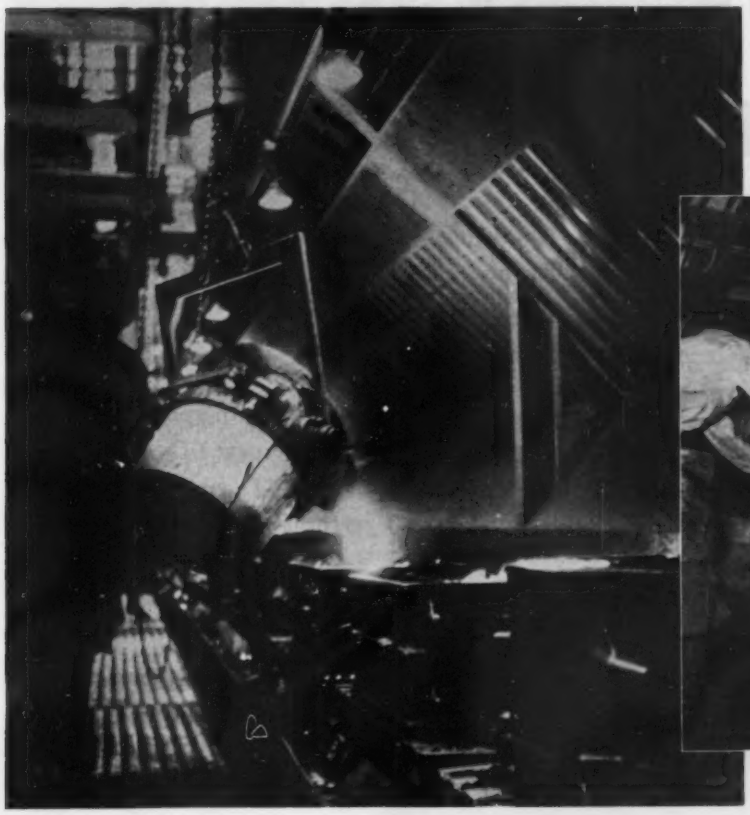
Schneible Uni-flo Compensating Hoods are available for all foundry operations—shakeout, pouring, smoke-off, mold cooling, etc.

Write for bulletin and complete information on Compensating Air Hoods.

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 296 Roosevelt Pk. Annex • Detroit 32, Michigan
Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

"PATENTS"
"All Schneible Equipment is covered by patents in United States and foreign countries. Infringements will be prosecuted."

SCHNEIBLE



Schneible Uni-flo Compensating Air Hoods in operation on cylinder block line in a large Eastern automotive foundry

Refer to Sweet's Plant Engineering File No. 1e–5c

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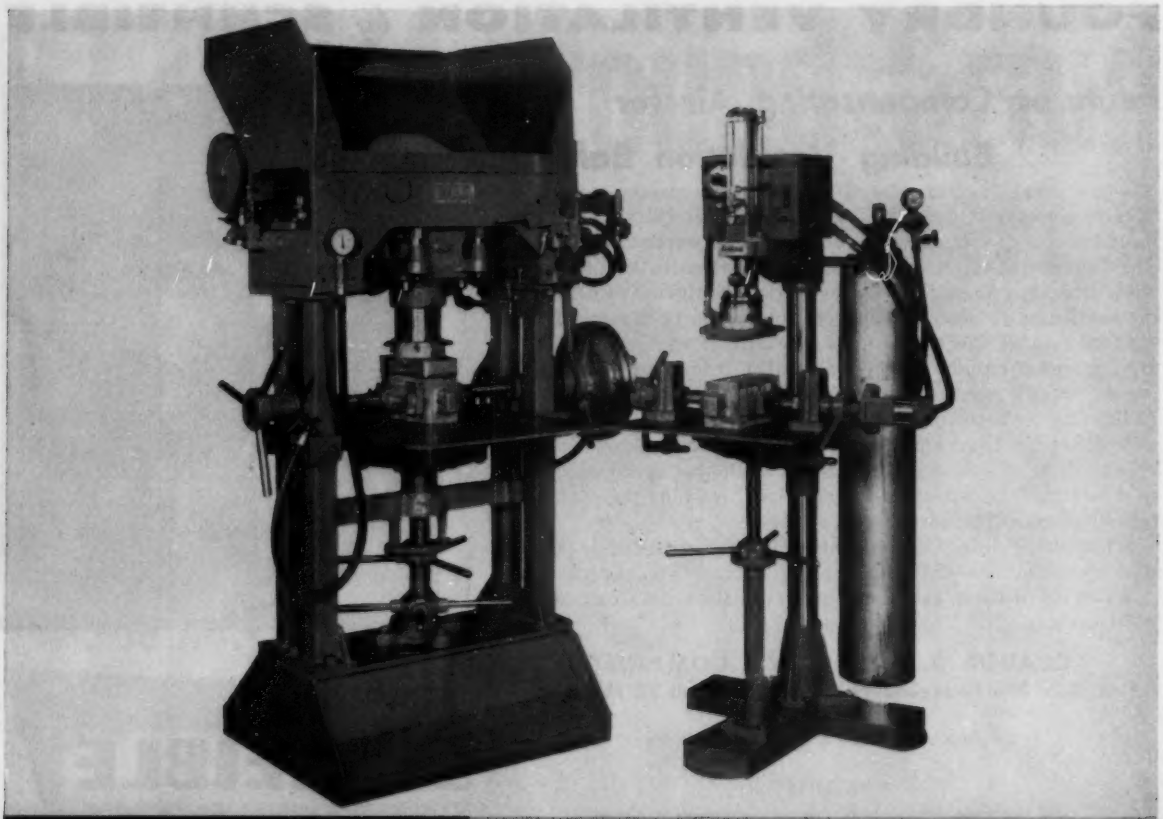

Redford

NO. 4 CORE BLOWER with MODEL H-1-E CO_2 CORE HARDENING STATION

The right tools to get maximum performance with a minimum of effort if you make cores by the CO_2 Process.

One core box is being blown while another one is automatically clamped, the cores hardened in the core box and the core box released ready to remove finished cores.

The table height of the Model H-1-E Core Hardening Station can be adjusted to correspond with the height of the core blower table. Gassing time is quickly changed to meet job requirements.

Whether you blow cores with conventional sand mixtures or use the new CO_2 Process, REDFORD EQUIPMENT gives you the best in over-all performance.

Redford **IRON & EQUIPMENT CO.**
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

write for
BULLETINS 4 and H

POSITIVE DUPLICATION—EVERY TIME!

One animal makes tracks like these, a pattern that is positively duplicated only by the grizzly bear. And only Cincinnati offers you the Positive Duplication of these SWING FRAME WHEELS, and of *all* CINCINNATI (PD) °SNAGGING WHEELS.

HOW WE ACHIEVE "PD"

To produce wheels of unsurpassed uniformity, Cincinnati developed a unique manufacturing process. It involves 36 separate quality controls, from formula blend to final inspection. For example, cams for temperature control of drying ovens must pass regular tests for accuracy, and checking procedures never vary.

HOW UNIFORMITY HELPS YOU

One big advantage of CINCINNATI (PD) WHEELS is—longer wheel life. Using (PD) WHEELS you get costs down and *keep* them down, because each reorder wheel will act and grind exactly like the original. This is the promise—and *performance*—of Positive Duplication.

CUT COSTS . . . CALL CINCINNATI

Our factory representatives are trained specialists, experienced in snagging and grinding operations. Their skills are at your service. Just call your CINCINNATI (PD) GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI GRINDING WHEELS

°Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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Whether you want information on an application, or service on an existing installation, the Ajax Magnethermic man can give you assistance. He knows induction heating and melting.

induction heating is our only business!

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CORPORATION

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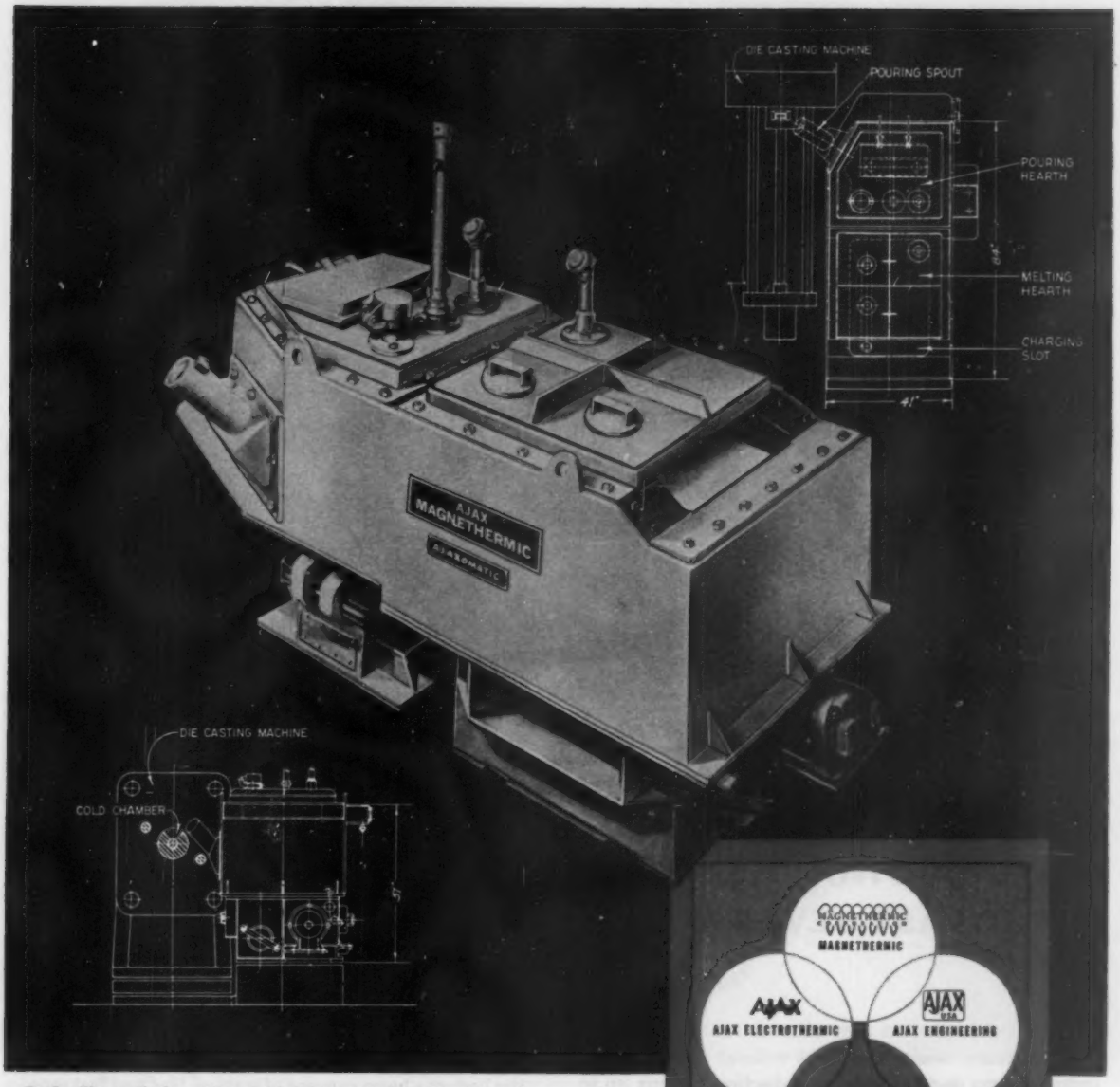
YOUNGSTOWN DIVISION...3990 Simon Road
Youngstown 1, Ohio



Duplex Ajaxomatic for melting and holding metal for automatic casting operations.

WATCH AM

FOR THE NEW IDEAS IN HEATING AND MELTING BY INDUCTION

The Automatic Pouring Ajaxomatic, one of many products by AM, for the heating or melting of metals by Induction.

"induction heating is our only business"

Ajax Magnethermic CORPORATION

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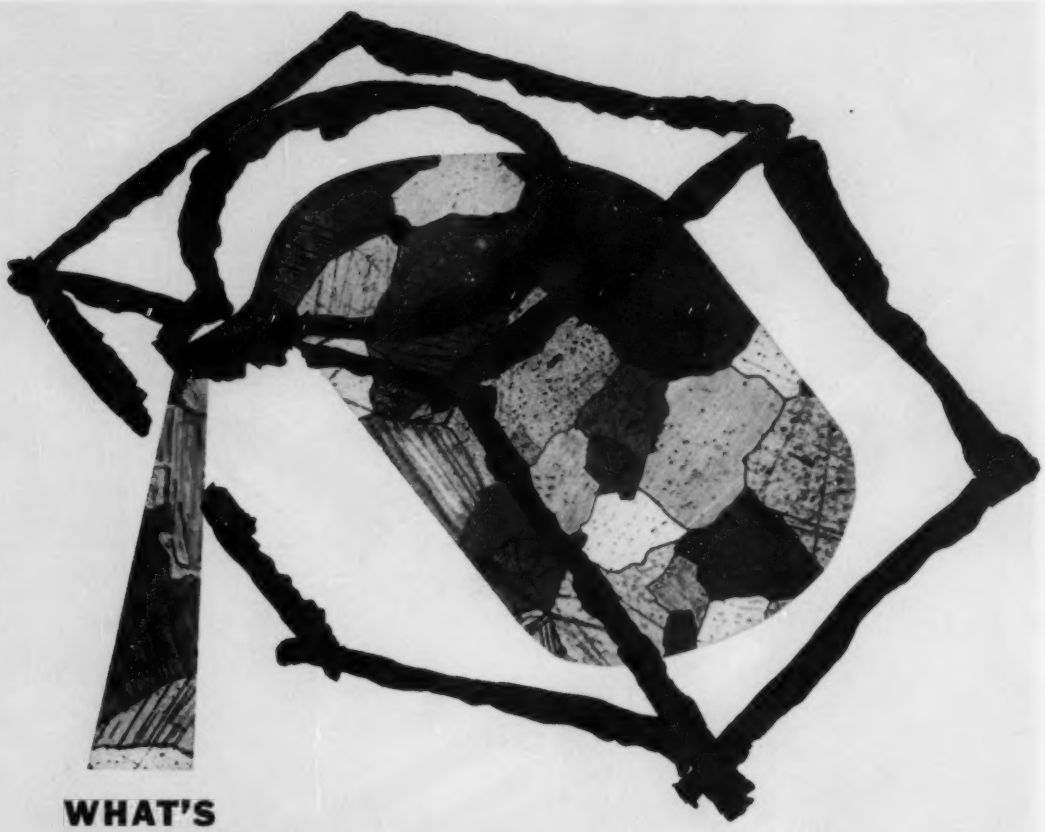

WHAT'S HAPPENED TO INDUCTION MELTING IN THE LAST SEVEN YEARS?

It's a little like the old days all over again! Induction melting passed twenty-five years without change. Then Inductotherm decided to bring induction melting up to date. Since that day, seven years ago, there've been some changes made.

To the basic advantages of induction melting—speed, cleanliness, magnetic stirring—Inductotherm has added easy installation, easy operation, and easy care.

For example, Inducto® initiated power feed through the trunions in their tilting furnaces—thus reducing lead length, cutting power loss, simplifying pit construction. Small furnace design is also ingenious. Even the smallest hand held furnaces have "plug-in" mercury type fittings for fast and effective power disconnect during a pour.

Why do business with Inductotherm?

The biggest innovation in induction melting has been the Inductotherm concept of service. Not just fast repairs and overnight replacement of parts (even M-G sets) . . . but a basic concept of "why we're in business." *Inductotherm is out to fit induction melting to your needs.* We will make every effort to improve our equipment and the induction technique, never asking you to trim your needs to the limitations of our equipment.

If you'd like more information on Inductotherm furnaces, write for Bulletin 70. But, for a taste of Inductotherm service, ask to have an engineer call. Inductotherm Corporation, 412 Illinois Ave., Delanco, New Jersey.

INDUCTOTHERM

Circle 590 on Page 55

X marks the trouble spot in seconds!

Xeroradiography cuts x-ray inspection time and cost! With this revolutionary method, radiographs are obtained electrostatically — images *dry* and ready to read less than a minute after exposure. A characteristic phenomenon called "highlighting" *automatically emphasizes discontinuities*—will show up defects indiscernible by other means. Here at last you find both *radiographic detail* and *high exposure speed* rolled into one!

Xero (zero) radiography is beyond doubt the long-awaited answer for many industries seeking fast, economical production-line x-ray inspection. Proved applications range from tire manufacturing to the production of extruded metal tubing, and it is particularly valuable in the *foundry* for inspecting light alloys. One prominent aircraft manufacturer* reports 25% cost savings with xeroradiography and is strongly urging its vendors to use it.

For complete details on xeroradiography, contact your local G-E x-ray representative now . . . or write to X-Ray Department, General Electric Company, Milwaukee 1, Wisconsin, for Pub. YY-114.

*Name available on request.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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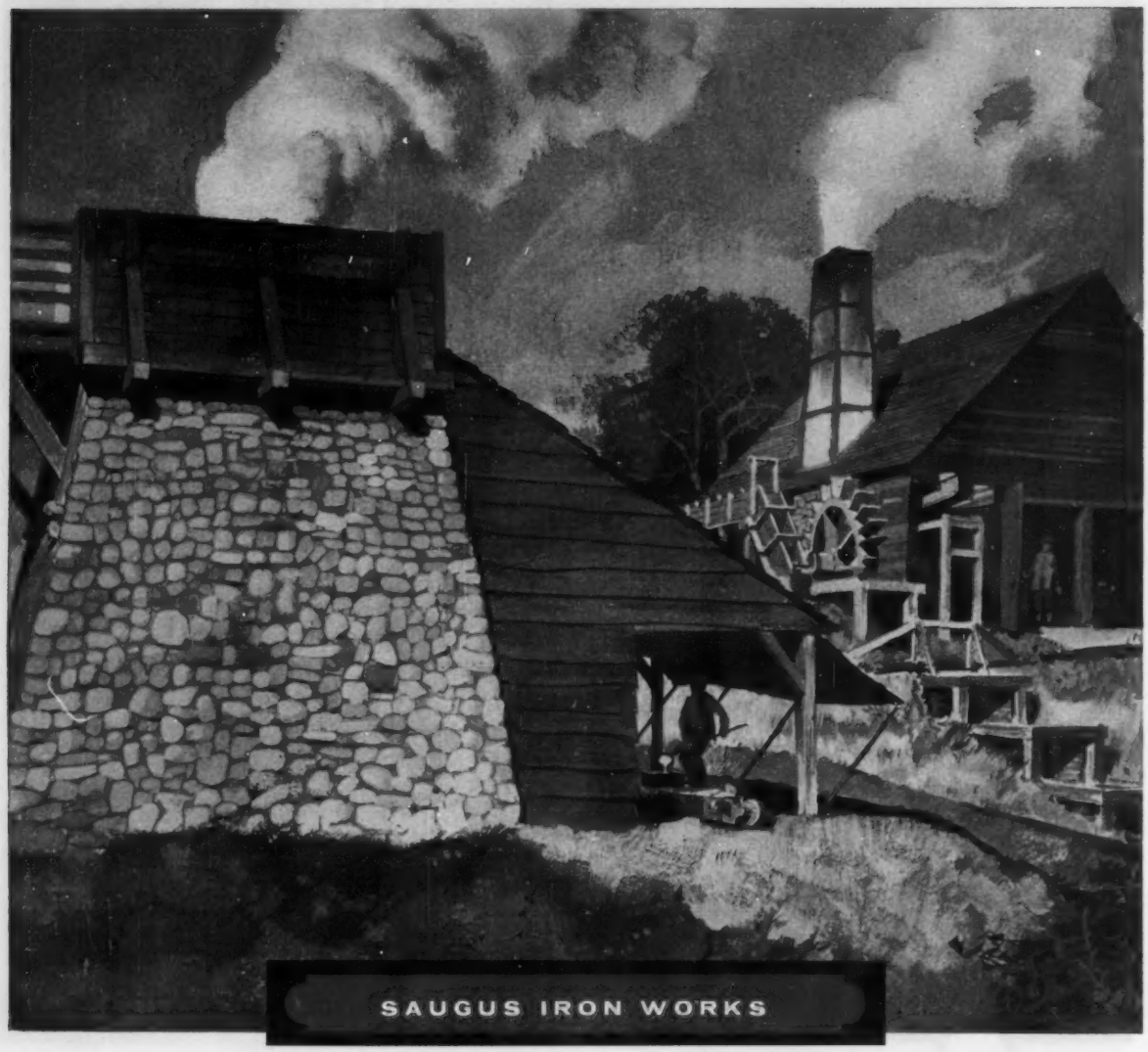
Gray Iron Foundry Milestones—No. 4



In 1642 Thomas Dexter and Robert Bridges established the first American iron foundry on the Saugus River, near Lynn, Massachusetts. An earlier attempt to construct a foundry at Falling Creek, Virginia in 1622, fell victim to an Indian massacre.

With English sanction, the Saugus Iron Works was granted exclusive rights to make and sell iron for 21 years. It could freely mine ore, cut wood, dam streams and set up furnaces on tax free, donated public lands. Employees were exempt from military duty and could stay away from church, "without losing voting privileges."

This was the birthplace of the famous "Saugus Pot," the first casting made in America. This was the beginning of ferrous casting on this continent.

As a supplier of quality foundry coke and pig iron, Pittsburgh Coke & Chemical Company is proud to contribute to the continuing growth of the great Gray Iron Foundry Industry.

Reproductions of "Saugus Iron Works," suitable for framing, may be obtained without charge by writing to the Coke & Iron Division, Pittsburgh Coke & Chemical Company, Grant Building, Pittsburgh 19, Pennsylvania.

COKE & IRON DIVISION

PITTSBURGH COKE & CHEMICAL CO.

GRANT BUILDING PITTSBURGH 19, PA.

Neville Pig Iron and Neville Coke for the Foundry Trade

Your castings carry your reputation...

it pays to find cracks before your customers do

No matter how carefully you control pouring, handling or other processing, cracks and other "invisible" defects are likely to appear in *some* of your castings. You owe it to yourself to find trouble makers as quickly, efficiently and economically as possible.

Not all cracks need rejection—or repair. But cracks in high stressed areas of parts are very serious. Extremely small cracks can cause early failure, if highly stressed!

First, finding all such defects early eliminates bad castings before they go to your buyer or before time is wasted in your own machining or assembly operations.

Second, even *more* important—a defective casting carries with it your reputation and your best chance for repeat business. Can you afford to wait for your customers to test your product for you—especially when you can identify any important defects so easily and economically with Magnaflux Test Systems?

Third, reliable quality is your own best protection against possible conversion from your castings to other means of fabrication. Consistent quality is "job insurance."

Magnaflux testing for magnetic metals and Zyglo for nonmagnetics are easy to use, positive and can save far more than they cost. The critical flaws you need to find appear directly on the part—actually glow with Magnaglo or Zyglo.

Magnaflux-Magnaglo and Zyglo fit into your operations at any point...wherever and whenever this will save you the most money to find and correct the cause of the defects. Many foundries now install Magnaflux or Zyglo "check-points" along their processing set-up to insure the quality and profits of their output—start to finish. For gray iron tests, the $195.00 type Y-5 yoke kit proves extremely useful.

Regardless of the size or kind of castings you make, from ounces to tons, a Magnaflux Nondestructive Testing Engineer can help you meet your planned requirements—for quality, cost—even market expansion. Ask to have him call soon...meanwhile write for data and case studies. MAGNAFLUX CORPORATION, 7350 West Lawrence Avenue, Chicago 31, Illinois.

With Magnaglo and black light, any cracks will show up as glowing indications. This casting was proved defect-free.

MAGNAFLUX-MAGNAGLO
For magnetic metals. Prices from $195.

ZYGLO
for nonferrous metals, stainless. Complete kits from $125.

STRESSCOAT
Shows where and how stresses occur, during design or pilot stage.

Y-5 YOKE KIT
Portable, lightweight magnetic particle testing. Complete kit only $195.

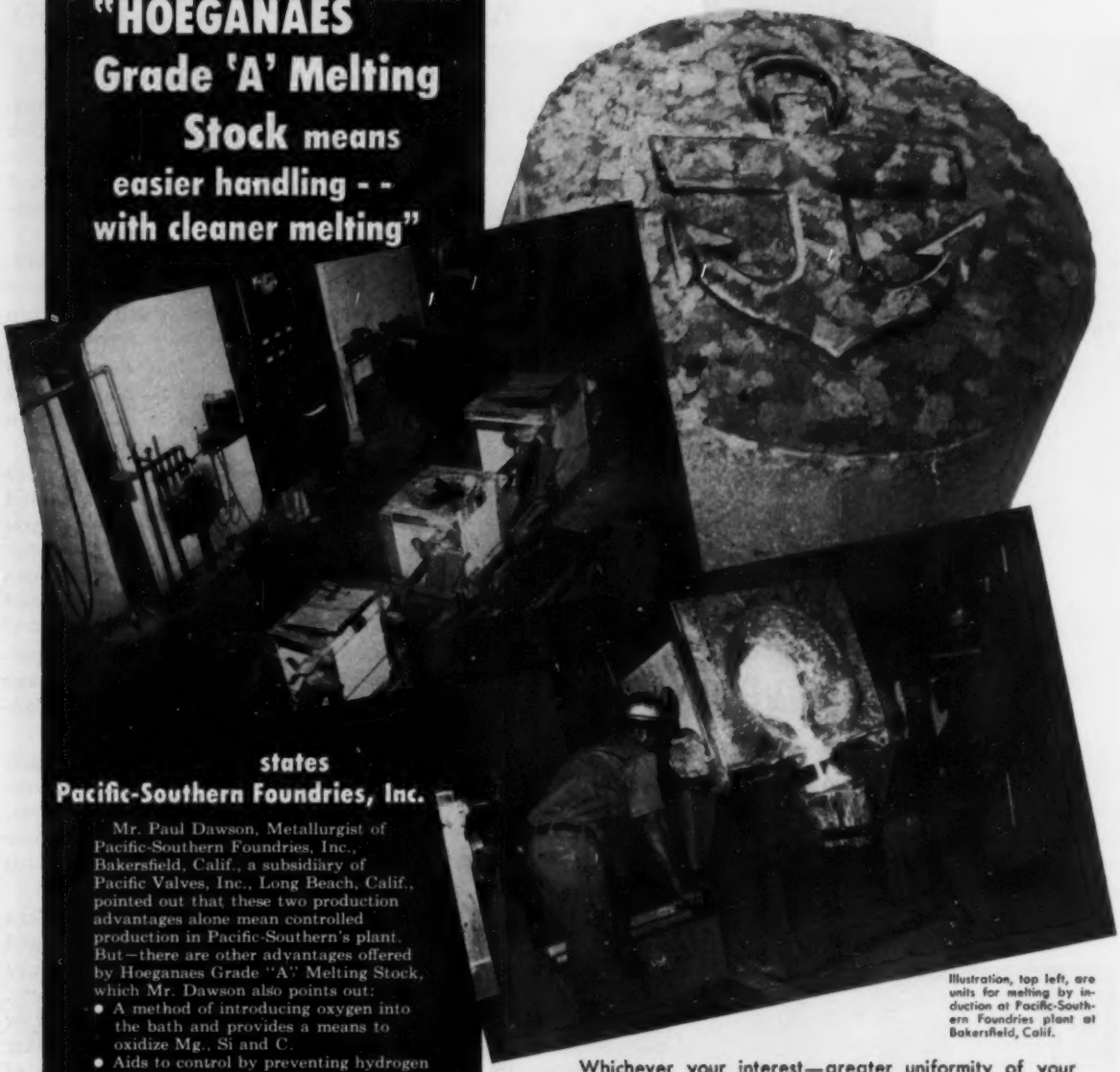
A SUBSIDIARY OF GENERAL MILLS

MAGNAFLUX CORPORATION

TEST SYSTEMS

Circle 593 on Page 55

"HOEGANAES Grade 'A' Melting Stock means easier handling - - with cleaner melting"



Illustration, top left, are units for melting by induction at Pacific-Southern Foundries plant at Bakersfield, Calif.

states Pacific-Southern Foundries, Inc.

Mr. Paul Dawson, Metallurgist of Pacific-Southern Foundries, Inc., Bakersfield, Calif., a subsidiary of Pacific Valves, Inc., Long Beach, Calif., pointed out that these two production advantages alone mean controlled production in Pacific-Southern's plant. But—there are other advantages offered by Hoeganaes Grade "A" Melting Stock, which Mr. Dawson also points out:

- A method of introducing oxygen into the bath and provides a means to oxidize Mg., Si and C.
- Aids to control by preventing hydrogen pick-up.
- Compares favorably in cost with low carbon pig previously made and used.
- Cleans out non-metallic inclusions better.

Your nearby Hoeganaes Service Engineer can acquaint you in more detail with the advantages of using Hoeganaes Melting Stocks. He's nearby and at your service.

Whichever your interest—greater uniformity of your steel analysis—or regularity of your melting operation . . . you'll be interested in the new Hoeganaes literature on melting stock.

Contains basic descriptive matter of this world famous melting stock that performs at least as well as high cost, low carbon, ingot iron. Literature includes prices, plus chemical and spectrographic analysis of both forms of melting stock, briquettes or chips.

Ask for form No. 124 . . . your copy will be in the return mail.

H S I C

HOEGANAES

HOEGANAES SPONGE IRON CORPORATION

RIVERTON, NEW JERSEY

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FOUNDRY

Reader Information Service

Advertising content is classified by subject and listed by page number for your convenience when studying specific foundry applications. For further information on subjects advertised, refer to advertisement on the page indicated and circle Item Number on Reader Service Card —Page 55.

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FOUNDRY

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FOUNDRY

NOVEMBER 1960

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420	450	480	510	540	570	600	630	660	690	720	750	780	810	840	870
421	451	481	511	541	571	601	631	661	691	721	751	781	811	841	871
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423	453	483	513	543	573	603	633	663	693	723	753	783	813	843	873
424	454	484	514	544	574	604	634	664	694	724	754	784	814	844	874
425	455	485	515	545	575	605	635	665	695	725	755	785	815	845	875
426	456	486	516	546	576	606	636	666	696	726	756	786	816	846	876
427	457	487	517	547	577	607	637	667	697	727	757	787	817	847	877
428	458	488	518	548	578	608	638	668	698	728	758	788	818	848	878
429	459	489	519	549	579	609	639	669	699	729	759	789	819	849	879
430	460	490	520	550	580	610	640	670	700	730	760	790	820	850	880

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CARD INVALID WITHOUT COMPANY NAME—TYPE OR PRINT

NAME _____

TITLE _____

COMPANY _____

PRODUCT MANUFACTURED _____

ADDRESS _____

CITY _____ ZONE_____

STATE _____

This card good until Jan. 15, 1961

FOUNDRY

NOVEMBER 1960

401	431	461	491	521	551	581	611	641	671	701	731	761	791	821	851
402	432	462	492	522	552	582	612	642	672	702	732	762	792	822	852
403	433	463	493	523	553	583	613	643	673	703	733	763	793	823	853
404	434	464	494	524	554	584	614	644	674	704	734	764	794	824	854
405	435	465	495	525	555	585	615	645	675	705	735	765	795	825	855
406	436	466	496	526	556	586	616	646	676	706	736	766	796	826	856
407	437	467	497	527	557	587	617	647	677	707	737	767	797	827	857
408	438	468	498	528	558	588	618	648	678	708	738	768	798	828	858
409	439	469	499	529	559	589	619	649	679	709	739	769	799	829	859
410	440	470	500	530	560	590	620	650	680	710	740	770	800	830	860
411	441	471	501	531	561	591	621	651	681	711	741	771	801	831	861
412	442	472	502	532	562	592	622	652	682	712	742	772	802	832	862
413	443	473	503	533	563	593	623	653	683	713	743	773	803	833	863
414	444	474	504	534	564	594	624	654	684	714	744	774	804	834	864
415	445	475	505	535	565	595	625	655	685	715	745	775	805	835	865
416	446	476	506	536	566	596	626	656	686	716	746	776	806	836	866
417	447	477	507	537	567	597	627	657	687	717	747	777	807	837	867
418	448	478	508	538	568	598	628	658	688	718	748	778	808	838	868
419	449	479	509	539	569	599	629	659	689	719	749	779	809	839	869
420	450	480	510	540	570	600	630	660	690	720	750	780	810	840	870
421	451	481	511	541	571	601	631	661	691	721	751	781	811	841	871
422	452	482	512	542	572	602	632	662	692	722	752	782	812	842	872
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FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States
—POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

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Penton Building
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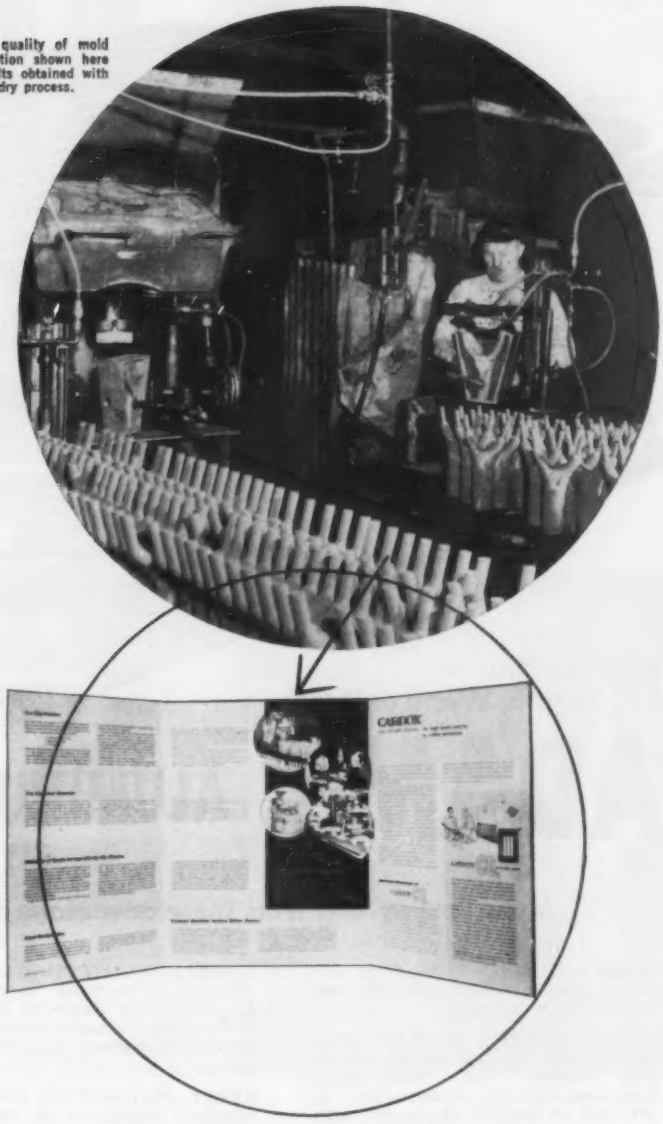
Reader's Service Dept.

The speed and quality of mold and core production shown here typifies the results obtained with Cardox CO_2 foundry process.



Want volume casting production

with speed and dimensional accuracy?

What are the critical elements which must be controlled for maximum efficiency with the CO_2 foundry process?

What kind of sand should be used with the CO_2 process?

What makes the CO_2 process work?

These are just some of the many questions answered for you in this important Cardox booklet.

Foundrymen agree, the CO_2 core and mold hardening process is an established part of your industry. This booklet helps show why — and also shows how the Cardox semi-precision molding process can combine new productive efficiency with economy for you.

As an important improvement over conventional CO_2 foundry techniques, the process is enabling a growing number of foundries to save money while producing more castings — with smoother finishes and to closer tolerances — than ever before. Machining time is minimized, set-up time is reduced. And this is accomplished with little or no additional equipment expense, no major change in existing production methods.

Send for your copy of this authoritative Cardox booklet — another example of the complete Cardox Technical Service available to you. Simply fill in the coupon and mail it to Cardox. It could be the first step towards bringing true operating efficiency to *your* foundry.

To Get the Full Benefit From Your CO_2 Process . . .

CARDOX® CO_2

in any form, in any quantity

Bulk liquid carbon dioxide — ready for use at your plant — in a Cardox Storage Unit. Cardox provides tank installation, maintenance and up-keep. You pay for nothing except the CO_2 you use under the terms of your "keep full" user contract. Cardox' fleet of trucks and rail tank cars operating from over 60 plants and depots assure reliable CO_2 supply. Cardox CO_2 cylinder gas, dry ice and converters also available.

CARDOX®

CO_2

CORE HARDENING SEMI-PRECISION MOLDING PROCESS

CARDOX

CHEMETRON

DIVISION OF CHEMETRON CORPORATION
Dept. 436, 840 N. Michigan Ave., Chicago 11, Illinois

CARDOX PRODUCTS: Carbon Dioxide Fire Extinguishing Systems, Trucks, and Foam Fire Equipment · Liquid Carbon Dioxide · Carbonic Gas · Dry Ice.

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Dept. 436

CARDOX . . Division of Chemetron Corporation
840 N. Michigan Ave. • Chicago 11, Illinois
Please send me a copy of your CO_2 Foundry Process booklet.

Name_____

Company_____

Address_____ City_____ State_____

Circle 595 on Page 55

Built for You in
Any Length, Width or Depth

ADAMS ALUMINUM EASY-OFF FLASK

Make real savings from these advantages!

RIGID CONSTRUCTION from our proven corner design, permits less weight with no loss of strength.

SOLID CORNERS are of the same design used on Adams Aluminum Slip Flasks. This interlocking tongue-and-groove construction is retained in perfect alignment with bolts secured through tapped end sections and locked with washers and nuts. Important! This construction has proved far superior to other forms of corner design.

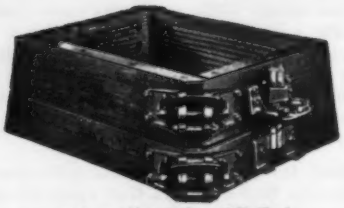
MALLEABLE TRIMMINGS are used on Adams Aluminum Easy-Off Flasks as on all other flasks we manufacture.

OPERATING MECHANISMS are identical with those used on the Adams Cherry Easy-Off Flask and incorporate the same simple adjustment and reversal of locking position.

STEEL PROTECTING STRIPS are standard equipment at top of cope and bottom of drag. Aluminum strips available upon request at no extra charge.

HANDLES AND TRUNNIONS are available when specified.

PIN AND EAR ARRANGEMENT available to interchange with present pattern plate guides.



Adams Cherry Easy-Off Flask

Adams Jackets, Cast Iron or Aluminum

Adams Steel Jacket

Write us today for further details . . . Cherry Snap Flasks—Cherry Slip Flasks—Aluminum Slip Flasks—Easy-Off Flasks—Cherry Presser Boards—Wood Bottom Boards—Steel Bottom Plates—Steel Jackets—Aluminum or Cast Iron Jackets—Steel Bands—Steel Upsets—Cherry or Aluminum Upsets

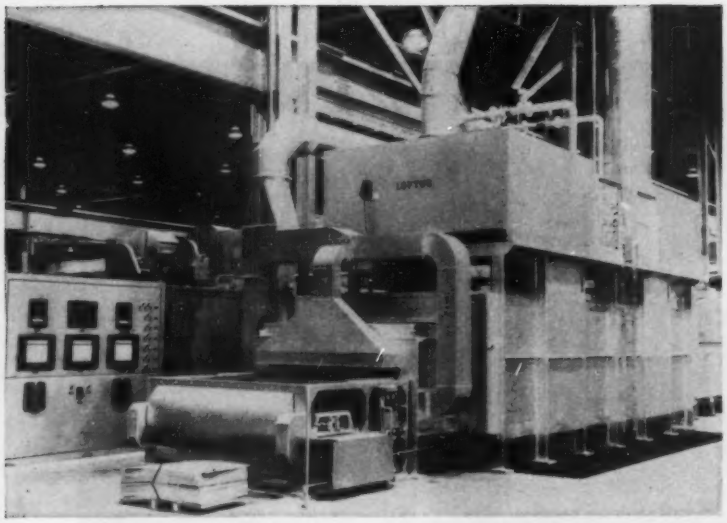
The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Circle 596 on Page 55



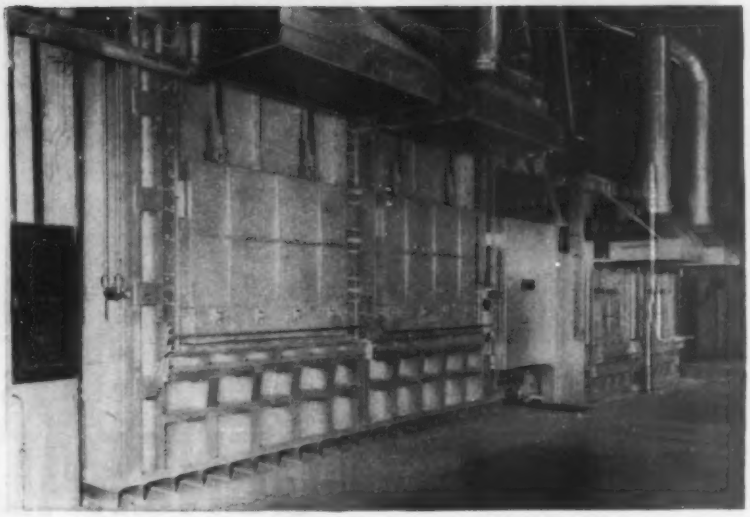
LOFTUS *Aluminum* FURNACES

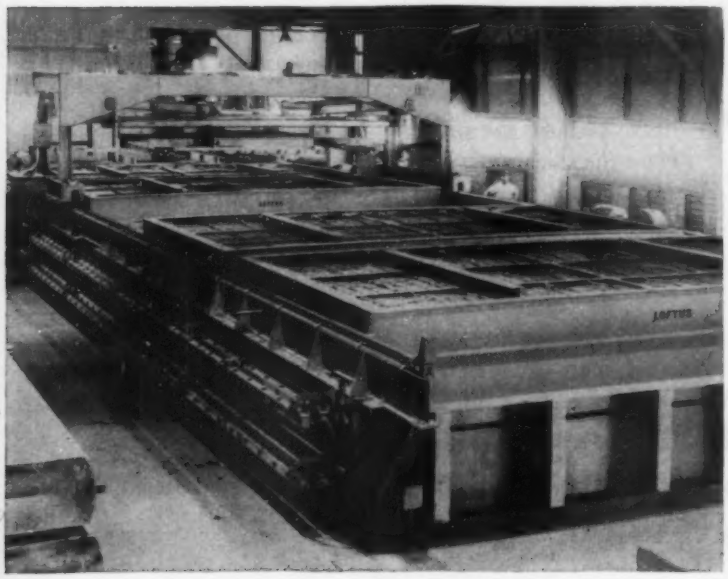
for
melting, holding,
reheating, annealing,
homogenizing

The many repeat orders for Loftus furnaces are the best evidence of customer satisfaction. Loftus furnaces offer:

- **High Production**
- **Economical Operation**
- **Low Maintenance**
- **Rugged Construction**

Whether building or expanding, you too can benefit from the wealth of experience available from Loftus.





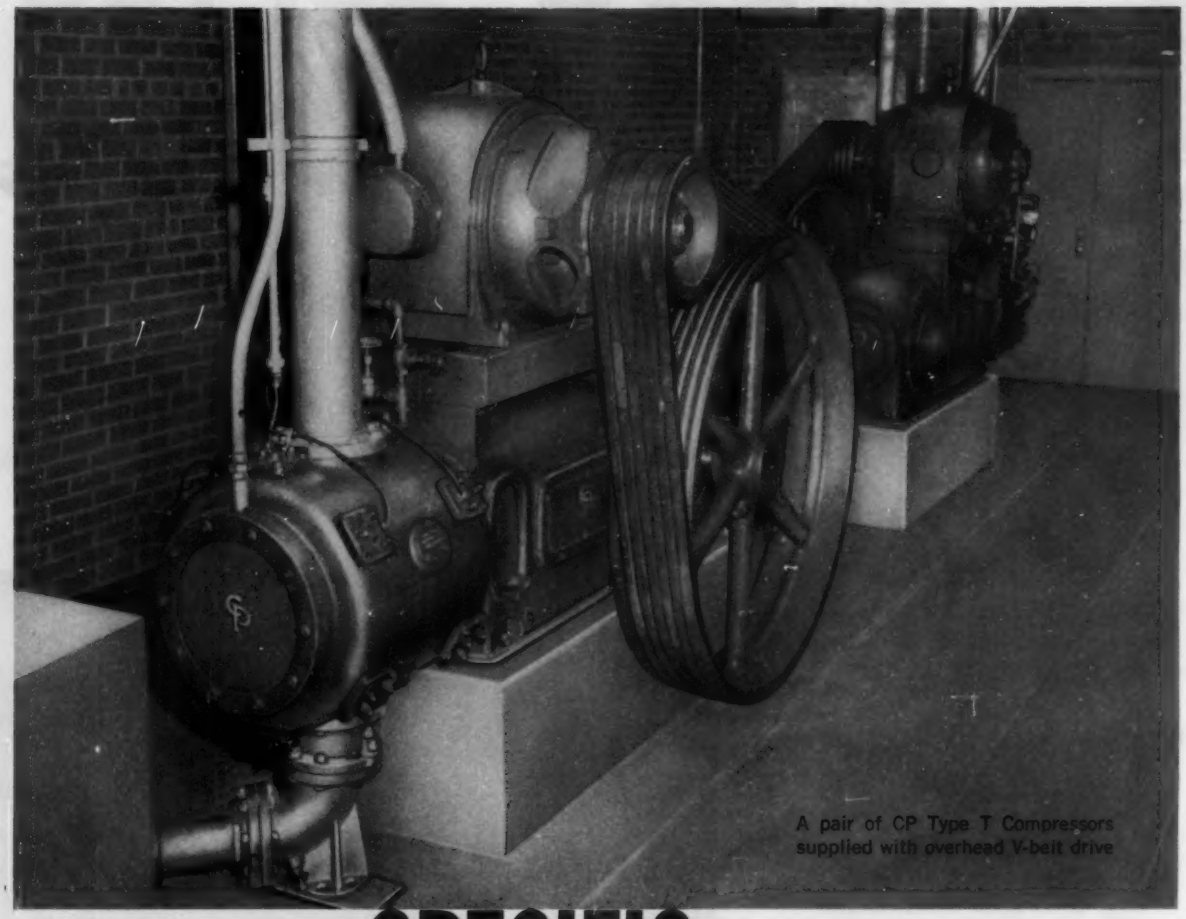
Loftus custom-builds complete plants and specializes in furnaces of all types and sizes for both ferrous and non-ferrous metals. Whatever your requirements, it will pay you to call on the engineering and construction know-how developed by Loftus over more than two decades of service to American metal producers.

From first heat to heat treat, look to

LOFTUS
Engineering Corporation
1 Gateway Center, Pittsburgh 22, Pa.

Circle 597 on Page 55

60.15.3



A pair of CP Type T Compressors supplied with overhead V-belt drive

here's a very SPECIFIC source of GENERAL foundry air...

CP LOW SPEED TYPE T COMPRESSORS

Specifically Superior Because:

1. Simplate valves permit low velocities
2. Complete water jacketing lowers operating temperatures
3. Large flow areas give low air velocities and low power consumption
4. Frame completely enclosed

Every foundry air-demand is met and assured with full-shift dependability when you use CP Type T Compressors. The slow speed characteristics of these machines give you dependability, performance and low maintenance so essential to foundry air supply. Available in a range from 20 to 125 HP. Units can be supplied with direct-connected synchronous motor, standard and overhead V-belt drives.

Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

FOR PROFITABLE HANDLING OF SCRAP, THE SWING'S TO

OHIO *lightweight* MAGNETS

• **Get faster operation** • **Work over wider radius** • **Cut wear and tear on crane**

With today's squeeze on profits, you can't afford to neglect any phase of your operations. And proper magnetic handling of scrap is one operation that you can control . . . can make pay off.

The best way is to specify Ohio Lightweight Scrap Handling Magnets. The 61″ model easily outperforms conventional magnets of greater diameter on deep-drawing material such as punchings, turnings, etc.

So give a lift to your profits—with Ohio Lightweight Scrap Handling Magnets. A-993A

Howell makes electric motors up to 300 HP for use in your yard.

Ohio 61″ lightweight, waterproof, aluminum-wound lifting magnet (above) weighs only 6750 lbs., lightest for its size known to industry—yet without sacrificing any of Ohio's famous rugged welded construction. Readily replaceable bolted pole shoe. Other Ohio lightweight welded magnets available; in 39, 45 and 55″ sizes with Protecto-Weld feature.

THE OHIO ELECTRIC MFG. CO.

5400 DUNHAM RD., MAPLE HEIGHTS, OHIO

A Subsidiary of Howell Electric Motors Company

ohio ELECTRIC

Circle 598 on Page 55

THE resources and facilities of Orefraction Minerals Inc. have been acquired by Metal & Thermit Corporation. As a result, the most complete service available on zircon is now offered by M&T.

The combined operation gives M&T sources of high quality zircon in both the United States and Australia for the production of granular, dry-milled and wet-milled zirconium silicates.

This expansion in zircon and the recent construction of a high temperature research center are part of a continuing M&T program to provide dependable supplies of high-performance zircon materials to foundries. Write for name of your distributor.

M&T Chemicals

The M&T line of **ZIRCONS** now includes:

ZIRCON SAND

ZIRCON FLOUR

Milled Zircon – 140 mesh
Milled Zircon – 200 mesh
Milled Zircon – 325 mesh
Milled Zircon – 400 mesh
Milled Zircon – 600 mesh

WET MILLED ZIRCON

MILLTROX* (Refractories grade)
ULTROX® "Standard" Opacifier
ULTROX® 500W Opacifier
ULTROX® 1000W Opacifier

*Trade Mark

METAL & THERMIT Corporation,
Rahway, N.J.

Mechanize with Jeffrey

Jeffrey Universal Mold Conveyor is positively hinged vertically and horizontally, to permit varying elevations to match best work height.

Automatic mold dump eliminates manual effort in normally hazardous area.

WHEN YOUR MOLDS RIDE ...you save time

Jeffrey offers floor type and pendant type (trolley) Mold Conveyors. Both are extremely flexible—can go where you want them to go and at low initial cost. The floor type can be equipped with automatic mold dump, pin-pointing the shakeout operation.

These systems can save you time—and time is money. Write for Catalog No. 911, The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

Circle 600 on Page 55

YOU'LL DO A BETTER JOB

with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.

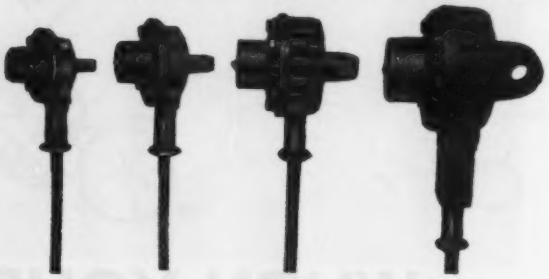
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

• SPEED • ECONOMY • SAFETY • LONGER LIFE
• GREATER SIFTING CAPACITY

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area — are mounted in a smooth steel ferrule with no jagged edgee to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- No. 11 NOISELESS TYPE VIBRATOR
- A-20 ELECTRIC VIBRATOR
- RED ELECTRIC KNEE SWITCHES
- "ROTO" ADJUSTABLE BIN VIBRATOR
- 2 MIN. UNIVERSAL FINENESS TEST SIFTER.
- UNIVERSAL TRIPOD CARRIER

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 "Cable Address: "Rotoplane Chicago" H. V. ADAMS, Mgr.

Combining high strength, corrosion resistance and toughness:

HERCULOY*
SILICON BRONZE CASTING ALLOY

Herculoy is an economical replacement for the costlier high tin content bronzes for many applications. It finishes to a rich golden color. Its strength is comparable to low and medium carbon steels. Its corrosion resistance is comparable to that of pure copper. Herculoy, with extremely low electrical conductivity, is also non-magnetic, easily worked hot, castable without the need for deoxidizing agents during melting. Write or call for new Herculoy literature: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N. Y. Telephone REctor 2-9500, or call your nearest Federated sales office.

*Patented by Revere Copper and Brass Incorporated; alloyed and marketed exclusively to the casting industry by Federated Metals Division.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

FEDERATED METALS DIVISION

Among the thousands of "hardware" products manufactured by the A. B. Chance Company of Centralia, Mo., are eyebolt castings for the electrical industry. These castings require a tough, high strength, corrosion resistant material with low electrical conductivity. Herculoy provided this unique combination of properties.

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ALTON, ILLINOIS
Alton: Howard 5-2511
St. Louis: Jackson 4-4040

BALTIMORE, MARYLAND
Orleans 5-2400

BIRMINGHAM, ALA.
Fairfax 2-1802

BOSTON 16, MASS.
Liberty 2-0797

CHICAGO, ILL. (WHITING)
Chicago: Essex 5-5000
Whiting: Whiting 826

CINCINNATI, OHIO
Cherry 1-1678

CLEVELAND, OHIO
Prospect 1-2175

DALLAS, TEXAS
Adams 5-5034

DETROIT 2, MICHIGAN
Trinity 1-5040

EL PASO, TEXAS
(Asarco Mercantile Co.)
3-1852

HOUSTON 29, TEXAS
Orchard 4-7611

LOS ANGELES 23, CALIF.
Angelus 8-4291

MILWAUKEE 10, WIS.
Hilltop 5-7430

MINNEAPOLIS, MINN.
Tuxedo 1-4109

NEWARK, NEW JERSEY
Newark: Mitchell 3-0500
New York: Digby 4-9460

PHILADELPHIA 3, PENNA.
Locust 7-5129

PITTSBURGH 24, PENNA.
Museum 2-2410

PORTLAND 9, OREGON
Capitol 7-1404

ROCHESTER 4, NEW YORK
Locust 5250

ST. LOUIS, MISSOURI
Jackson 4-4040

SALT LAKE CITY 1, UTAH
Empire 4-3601

SAN FRANCISCO 24, CALIF.
Atwater 2-3340

SEATTLE 4, WASHINGTON
Main 3-7160

WHITING, IND. (CHICAGO)
Whiting: Whiting 826
Chicago: Essex 5-5000

IN CANADA: Federated Metals Canada, Ltd.
Toronto, Ont., 1110 Birchmount Rd., Scarborough, Phone: Plymouth 73246

Montreal, P.Q., 1400 Norman St., Lachine, Phone: Melrose 7-3591

Circle 602 on Page 55

FOUNDRY SAND WITH TRULINE® BINDER MAKES QUALITY CORES

Naval Stores Department

HERCULES POWDER COMPANY

INCORPORATED

Hercules Tower, 910 Market Street, Wilmington 99, Delaware

NF60-1

they turn in top performance to turn out top results

SIMONDS NEW SERIES 60

DOUBLE XX

Reinforced Resinoid
DEPRESSED CENTER WHEELS

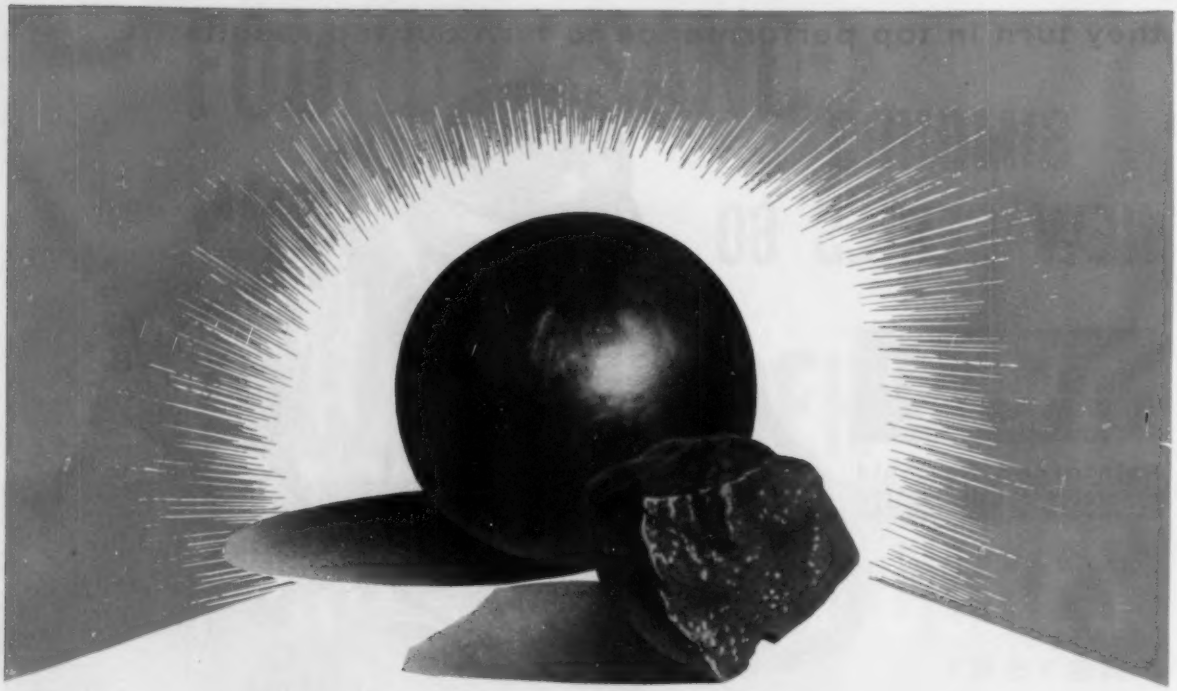
FASTEST BY FAR FOR PORTABLE GRINDING

Better than ever because of new manufacturing methods . . . and still fastest and most economical for weld grinding. You can count on exceptional efficiency with Double XX wheels in new Series 60. Each wheel has maximum abrasive grain and is doubly reinforced for extra strength and safety. Lightweight rigid type for general use . . . especially recommended for grinding welds. Also available . . . slightly flexible Fibrex wheels for your lighter jobs and for stainless steel. Order from your Simonds distributor.

Send for Bulletin ESA 244

SIMONDS
ABRASIVE CO.
Vacony & Fraley Sts.
PHILADELPHIA 37, PENNA.
Division of Simonds Saw and Steel Co.
COUNT ON / YOUR SIMONDS DISTRIBUTOR
FAST SERVICE • LOCAL STOCKS

WEST COAST PLANT: EL MONTE, CALIF.—BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO
SHREVEPORT — IN CANADA: GRINDING WHEELS DIVISION, SIMONDS CANADA SAW CO., LTD., BROCKVILLE, ONTARIO • ABRASIVE PLANT, ARVIDA, QUEBEC



NOW...1960's big "break-through" in metal abrasives

SHOT GLOBITE GRIT

Product of 53 years Shot Making Experience and 23 years of sponsored industrial research

*PAT. APP'D FOR

An *entirely* new metal abrasive*—a metal transformation never before supplied in the form of shot and grit, and made by new methods never before used for making metal abrasives.

That's GLOBITE—perfected after 2 years intensive research working with a team of expert metals research scientists having at their command all the facilities of one of the world's largest industrial research organizations, famous throughout the metal working industry.

GLOBITE has the hardness range, toughness and resistance to breakdown of higher priced steel abrasives, and sets new standards of low cost blast-cleaning in comparison with lower priced metal abrasives, of other types.

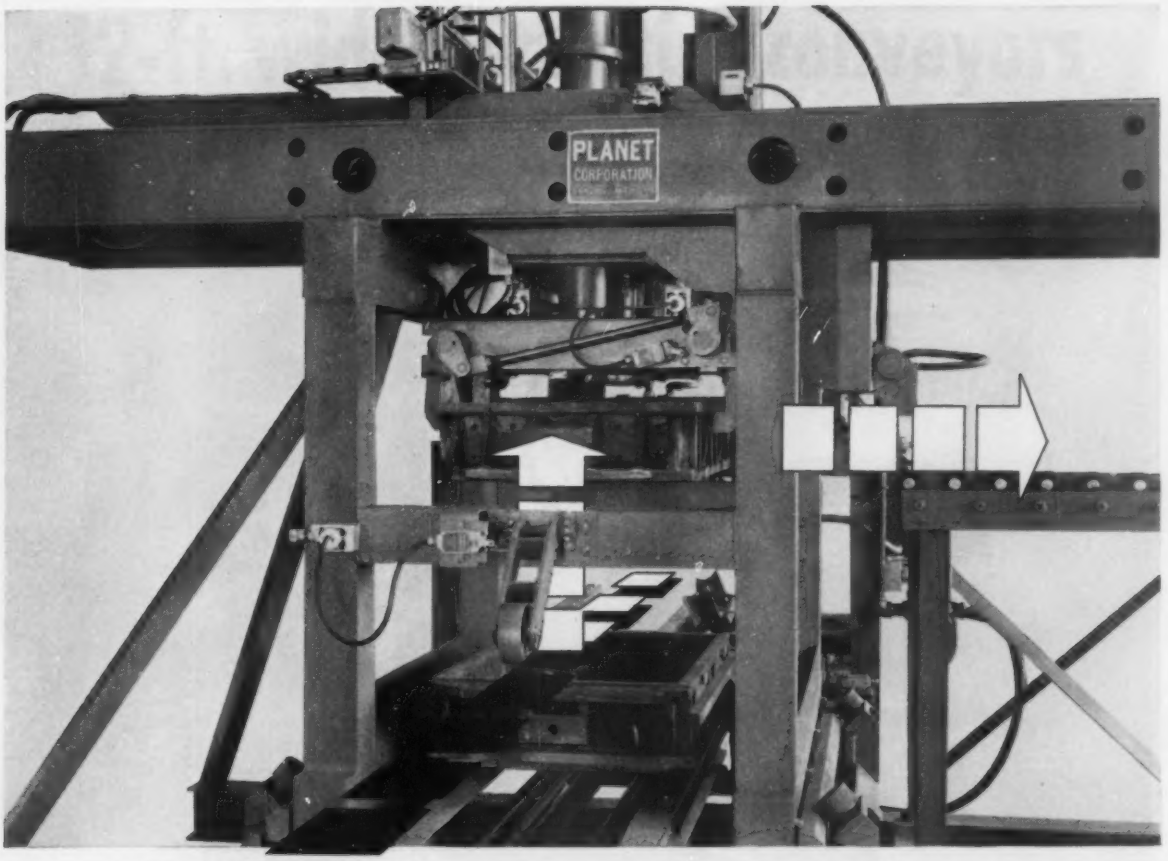
GLOBITE is part and parcel of today's world advance in science, applied to the improvement of metal abrasives. It sets new marks for other abrasives to follow. Be among the first to benefit from GLOBITE. Write us.

THE GLOBE STEEL ABRASIVE CO.

MANSFIELD, OHIO

Sold by many leading distributors of foundry supplies from coast to coast.

Circle 605 on Page 55



Arrows indicate flask movement;
■ DRAG □ COPE.

another example of Planet Versatility . . .

AUTOMATIC COPE STRIPPER HANDLES 250 MOLDS PER HOUR – LOWERS COSTS, IMPROVES SAFETY

This Planet cope stripper automatically handles molds on a 15-second cycle, and by doing the work of three men, it lowers costs and reduces spill-out injuries. Although designed for a specific mold handling system, the principles used in engineering this cope stripper could be incorporated in almost any system as either a stripper or setter.

COPE STRIPPER OPERATION. The most important requirement of this machine is to strip the cope flask. without damaging the casting—this demands perfect synchronization. Synchronization is accomplished by dogs, which, upon engaging an approaching mold car, activate the machine's following mechanism. When the machine and the car are traveling at identical speeds and are in perfect registration, the stripper mechanism clamps onto the cope flask's upper flange and lifts it off the drag flask. At the same time a hold-down bar is inserted into the mold to prevent upward movement of the casting. After the cope flask has been stripped, it is shuttled onto a roller conveyor, in position for movement to shakeout.

PLAN WITH PLANET. This cope stripper is another example of *Planet Versatility* . . . Planet's skill and know-how in engineering, manufacturing and erecting all kinds of automatic foundry handling equipment from special machines to complete mold, sand or other systems. Write or call today for a demonstration of how PV can help you . . . you'll find *it pays to plan with Planet.*

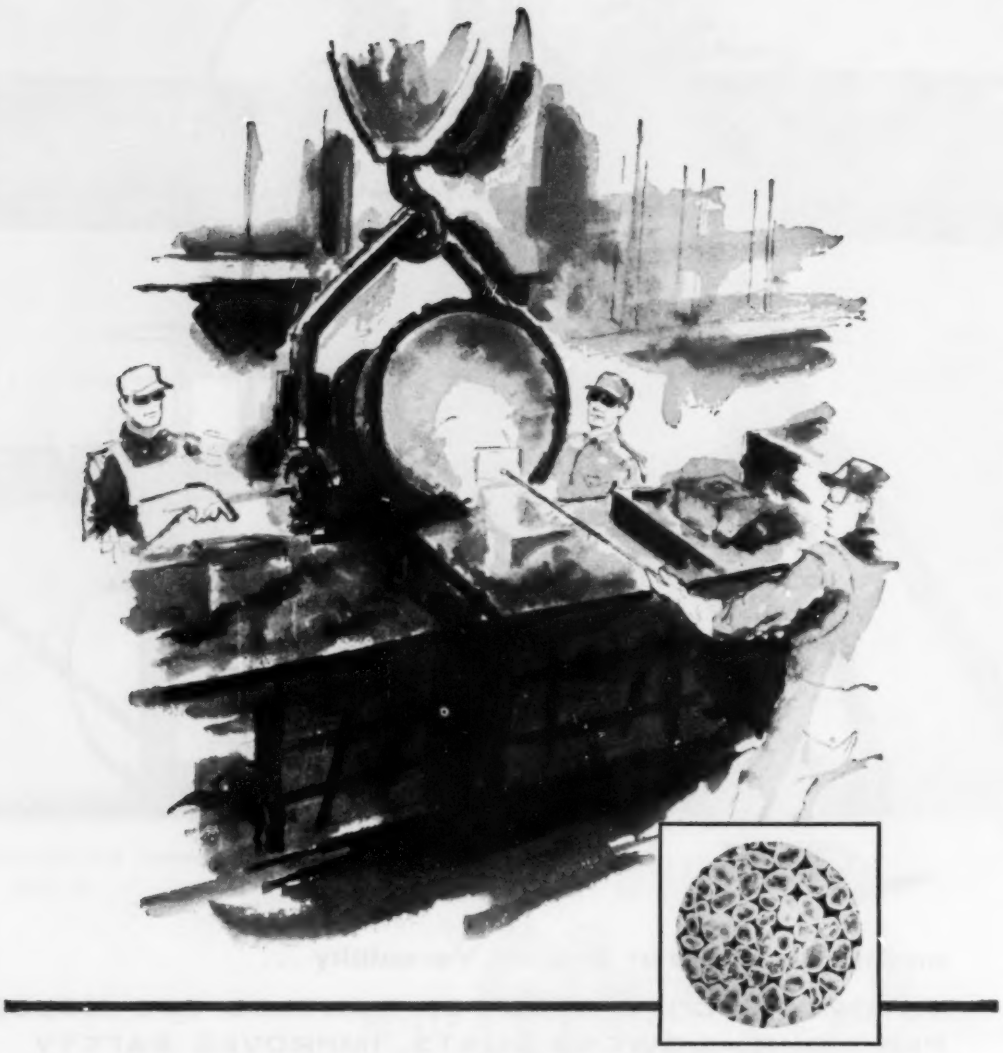
PLANET CORPORATION

1818 SUNSET AVENUE • LANSING, MICHIGAN

- Engineered Handling Systems
- Automation Equipment
- Mill & Foundry Handling Equipment

08

Circle 606 on Page 55



ALL THE MERITS OF ROUNDED-GRAIN QUALITY ARE YOURS WITH WEDRON SILICA...

We feel the name Wedron means a number of things to foundrymen: Quality, purity, rounded-grain structure, and a wide range of A. F. S. grades to choose from. Of these, quality and the rounded-grain advantages stand out. They tell you that Wedron Sands give you the basis for better controlled castings. Try Wedron today and experience better results.

WEDRON SILICA COMPANY

135 South LaSalle Street • Chicago 3, Illinois

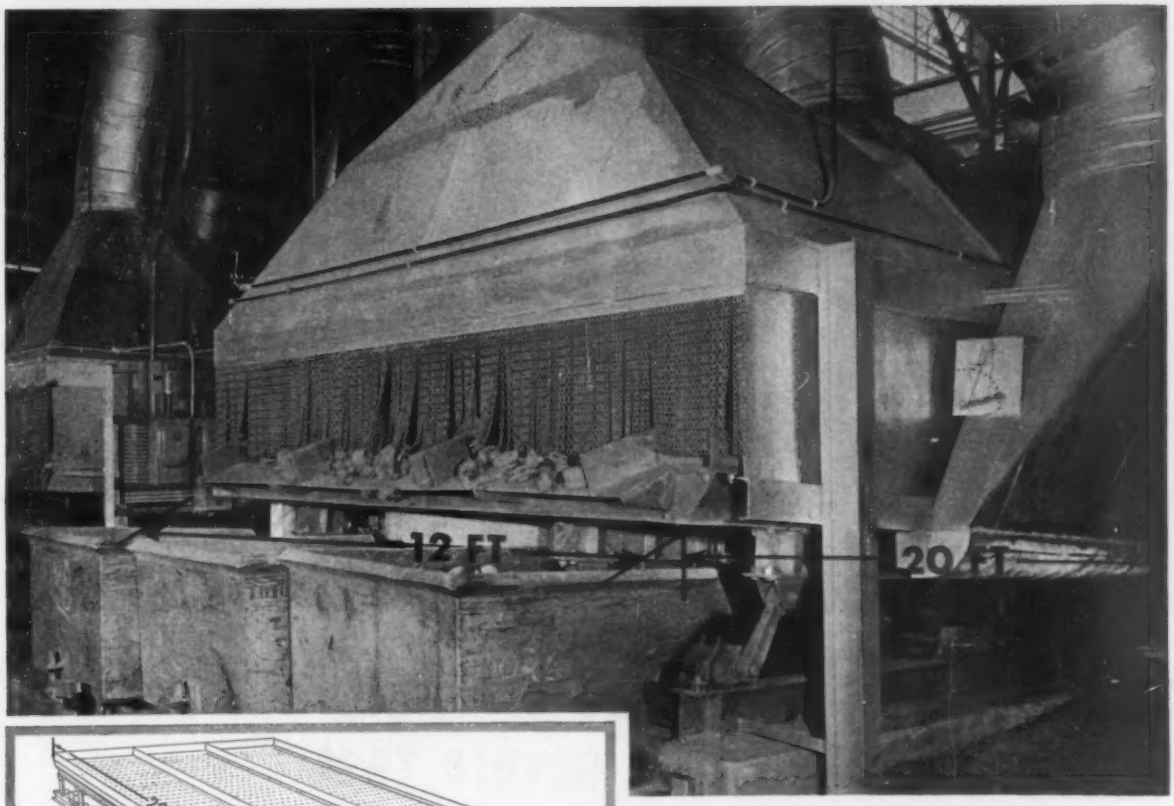
Send for illustrated brochure on Wedron sands.

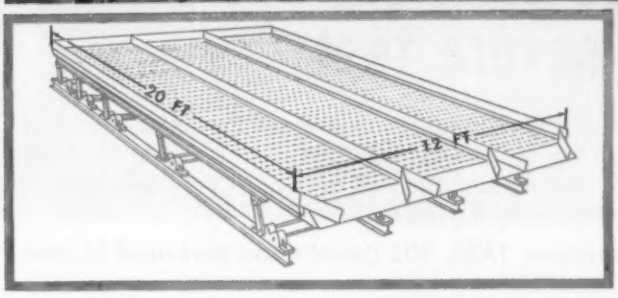
MINES AND MILLS IN THE WEDRON-OTTAWA DISTRICT

Circle 607 on Page 55

12-ft. wide oscillating conveyors

take castings through air quenching in 3600-lb. batches





POSITIVE ACTION! NATURAL FREQUENCY!
Like all Link-Belt oscillating conveyors (Coilmounts for medium duty, Flexmounts for light duty), the mammoth, heavy-duty Torqmounts at this installation operate with a combination of natural frequency and positive action. Natural frequency results in low operating requirements and minimum stress on parts under load. Positive action of the unit's eccentric drive provides a constant, uniform conveying action . . . even under surge loads which often dampen-out other types of vibratory conveyors.

Huge LINK-BELT Torqmount conveyors assure uniform cooling at large midwest automotive foundry

Normal widths of Link-Belt oscillating conveyors range up to 48 inches. But to meet the needs of this air quenching job, Link-Belt custom-designed three 12-ft. wide giants.

As the red hot castings ride to the air chamber, oscillating action spreads the batch evenly over the perforated plate Torqmount bed . . . voids are minimized. Result: maximum exposure to air, uniform quenching.

For the best in light, medium or heavy-duty conveying, call your nearest Link-Belt office or authorized stock-carrying distributor. Or write for Book 2744. It contains complete data on all three types of Link-Belt oscillating conveyors: Torqmount, Coilmount, Flexmount. 9E.308

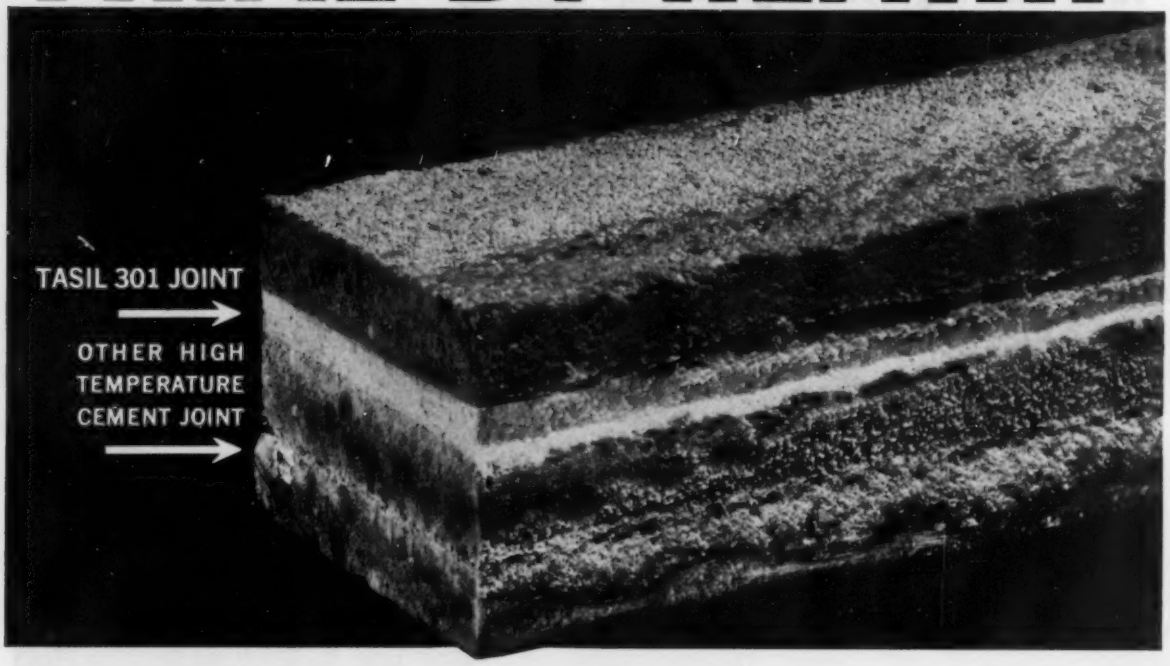
LINK-BELT

OSCILLATING CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

Circle 608 on Page 55

TRIAL BY HEAT...



Superior Refractoriness of TASIL 301 Cement proved by severe test

TEST DETAILS...

Three slices of TAMUL brick were cemented together with approximately ¼" thick joints — one of TASIL 301 Cement, the other a widely used air-setting high temperature cement. After drying, an 11-lb. brick was placed on top of the specimen which was then put in a laboratory re-heat furnace. The specimen was fired to 3000° for five hours, then allowed to cool. The brick was then sectioned, as shown.

Get TASIL Special Refractory Cements in the form you prefer:

No. 301 Air-Setting Cement — ready-mixed in drums.

No. 317 Air-Setting Cement — dry in bags.

No. 302 Heat-Setting Cement — dry in bags.

After five hours at 3000° temperature, the TASIL mortar in this test "sandwich" was unaffected. In the other joint, the cement has melted and run out—permitting the brick to press completely together.

New improved TASIL 301 Cement was developed to pass these specifications:

- **Superior refractoriness . . . high bonding strength . . . improved workability . . . minimum shrinkage at high temperatures . . . maximum resistance to slagging and erosion . . . ability to stay in suspension.**

Get maximum joint protection by using TASIL 301 Cement for your next furnace rebuild.

Call in your Taylor Field Engineer, or write direct for details.

Exclusive Agents in Canada:
REFRACTORIES ENGINEERING AND SUPPLIES, LTD.
Oakville, Ont., and Montreal

The CHAS. TAYLOR SONS Co.
A SUBSIDIARY OF NATIONAL LEAD COMPANY
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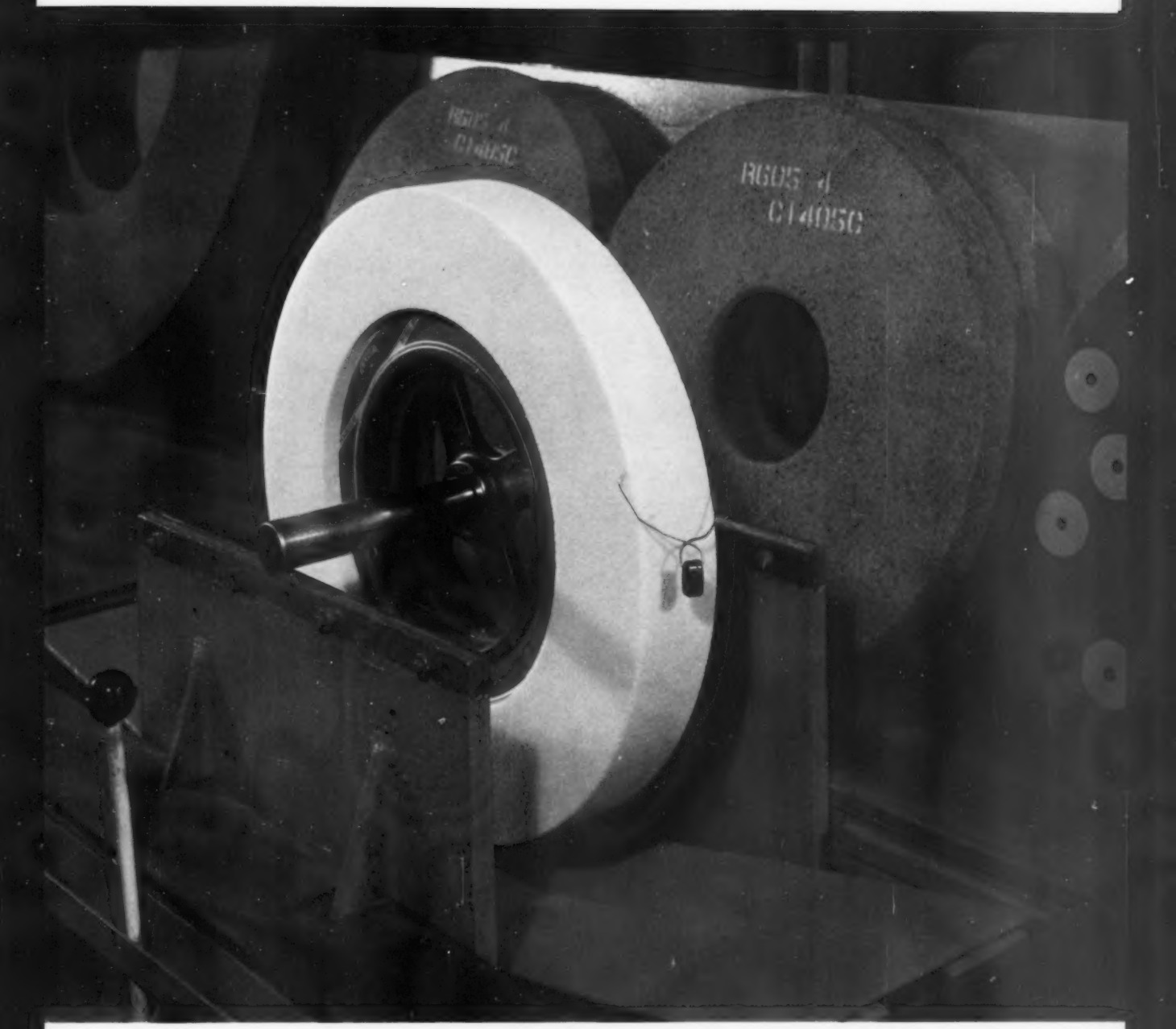
REFRACTORIES SINCE 1864 • CINCINNATI • OHIO • U. S. A.

Circle 609 on Page 55

Circle 610 on Page 55→



Balanced to a thousandth

Every Peninsular wheel must pass the most rigid test for balance to insure freedom from vibration and smooth operation. Out-of-balance allowance may be less than 1/1000th of wheel weight, as little as one gram—depending on recommended wheel application.

When you add to this our highly effective methods of assuring uniform density, you can be sure that any Peninsular wheel —vitrified or resinoid—will do its job smoothly and efficiently.

Have you seen our new catalog? It's just off the press. Ask for a copy.

PENINSULAR

GRINDING PENINSULAR **WHEELS**

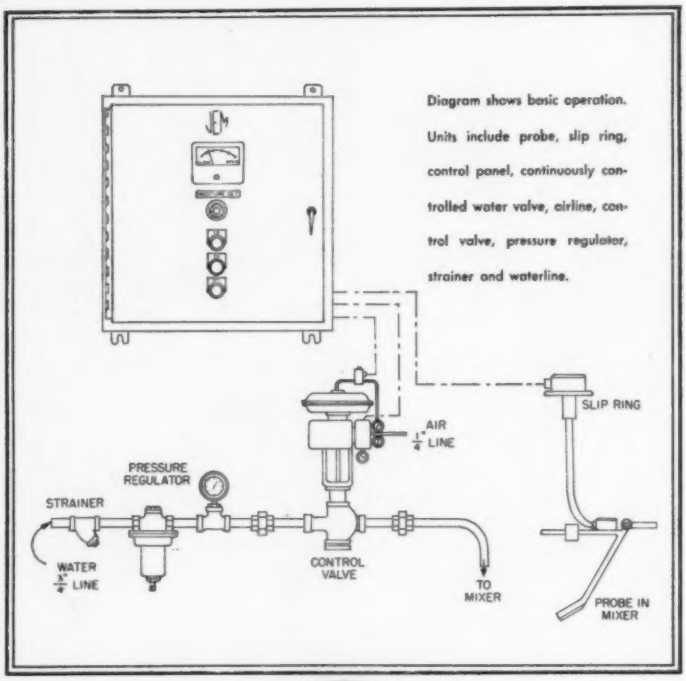
District Representatives and Distributors In All Principal Cities

PENINSULAR GRINDING WHEEL COMPANY • 729 MELDRUM AVENUE • DETROIT 7, MICHIGAN

JEMATIC
MOISTURE CONTROL

automatically maintains the moisture content in molding sand . . . . .

either in a batch or continuous mixing. The brain of the operation is a sensitive probe that determines the amount of moisture in the sand. It flashes this information to a control panel. The control panel, after digesting the news, signals a water valve electrically, and orders it to increase or decrease the amount of water being supplied to the sand mix. The complete system, sketched at the right, takes up no more space than a couple of suitcases. Moreover, it can be installed and put in operation in a matter of hours.



JEMATIC

can solve other foundry control problems, too: SAND LEVEL in the bins, for example . . . or SAND DISTRIBUTION to the molders . . . or BOND ADDITION to the mix . . . or MIXER CYCLING. We also invite inquiries concerning our FLAME HARDENING CONTROL EQUIPMENT.

JEMATIC

is the first step to foundry automation. We would like to tell you how JEMATIC could be put to profitable work in YOUR foundry. All inquiries handled promptly, no strings attached.

JEM

LABORATORIES, INC.

1108 W. 5th St. WOODLAND 4-7110 ASHTABULA, OHIO

Circle 611 on Page 55

Why Foundries are Sold on Carver RAPID MULLER

1 "We are using natural bonded sand in our plant and find the Carver Muller has cut down on bonding material better than 50%. We like the Muller very much."

— G. W. Maufoll
West Coast Alloys Co.
Troutdale, Oregon

2 "The Carver does a good job for what it was designed. A low priced mixer. Small floor space and does a good job of mixing with CO_2 Sand."

— Neilan Williams, Vice President
Industrial Castings Division
James H. Mathews Co.
Pittsburgh, Pennsylvania

CHECK . . . COMPARE AND YOU'LL CHOOSE CARVER!

- **The fastest! A batch every 75 seconds!***
- **Only one moving part . . . no maintenance worries!**
- **Absolutely no lumps or wet spots!**
- **Easiest to clean! Just reach inside!**
- **3 times lower initial investment than with most mullers!**
- **Works equally well with any kind of binder!**

*Applies to CO_2 Sand. Oil sand may take up to three minutes.

Only Carver Has Everything For the CO_2 Process!

CARVER V & S Core Shooters

CARVER Automatic Gassing Apparatus

KRAUSS Taper Slot Core Vents

STEINEX available only from CARVER

MAIL COUPON TODAY

F-9

CARVER FOUNDRY PRODUCTS CO.
Muscatine, Iowa

I want to compare! Tell me more about Carver Rapid Muller.

NAME _____ TITLE _____

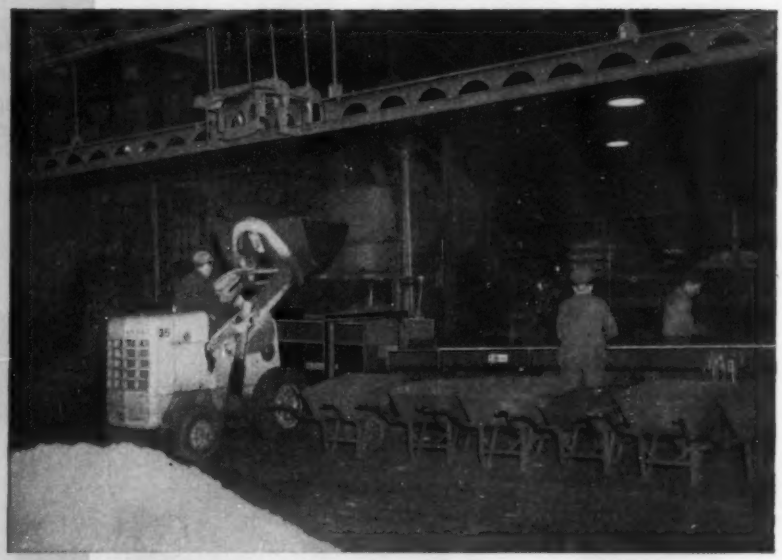
FOUNDRY _____

CITY _____ STATE _____

Circle 612 on Page 55

OHIO STOVE COMPANY FOUNDRY holds production costs down with SIMPLICITY equipment

At Portsmouth, Ohio, in the modern foundry of the Ohio Stove Co., the SIMPLICITY 4′ x 6′ shakeout and the 30″ x 17′ model VS-12 conveyor (shown here at work) are helping speed operations and reduce unit production costs. First, snap molds are floor dumped; then both castings and sand are scooped and loaded onto the SIMPLICITY shakeout. The castings are then carried on the SIMPLICITY conveyor to the waiting tote boxes. The many plants that are using SIMPLICITY shakeouts are indicative of their foundry-proved superiority. Get complete facts on SIMPLICITY shakeouts, feeders, and conveyors. Write us today.



SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.
FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario
FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED
ENGINEERING COMPANY • DURAND 7, MICHIGAN

190

Stub at left shows average waste with conventional cutting carbons; piece at right shows small amount of waste with Kostkutter Rods.

"We save 20 to 25% over conventional cutting carbons with Speer's new KOSTKUTTER RODS*"

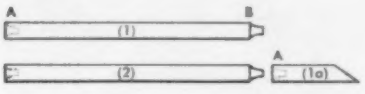
says Benjamin Desper, Cleaning Room Foreman, Atlantic Steel Castings Co., Chester, Pa.

You can save money too! The revolutionary design of Kostkutter Rods, a Speer development, allows the joining of the normally discarded 2½ to 3 inches "waste" to the front of the next rod for further use. Additional savings are realized due to reduced torch damage. It is no longer necessary to economize by burning carbons close to the clamp, bringing the torch too near the hot spot. Additional "left over" carbon is used up with the next rod. This virtually eliminates stub loss. It is important to note that Kostkutter Rods are copper plated (except for the tapered sections) after shaping the rod ends, thereby insuring perfect contact between rods.

Kostkutter Rods are available only from Speer. Buy them in diameters of ½", ⅝", ¾" and 1". Standard cutting carbons are also available at slightly lower prices.

How Kostkutter Rods Save You Money

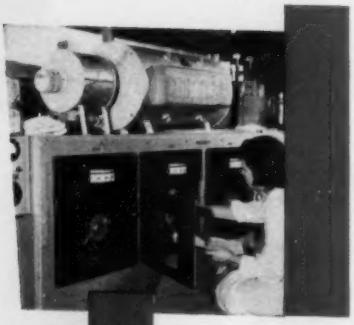
Each Kostkutter Rod has a tapered hole in one end (A) and a tapered projection at the other end (B) as shown in Diagram 1. The rod is clamped into the torch and used in the normal way. The stub end (Diagram 1a) which, with conventional cutting carbons would be wasted, is removed from the torch and attached to the end of a new Kostkutter Rod (Diagram 2). The tapered end of the new rod slips easily into the tapered hole at the end of the stub and is held firmly by friction. The new rod, with the stub attached, is then clamped into the torch and practically the entire stub is used up instead of being discarded.

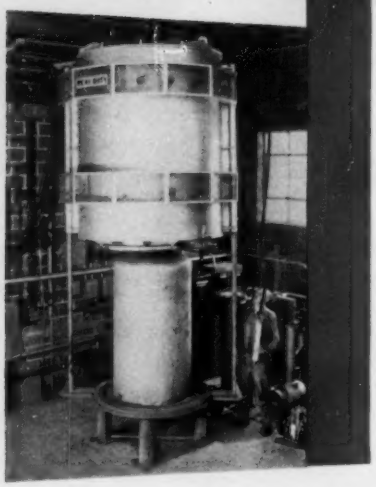


SPEER Carbon Co.
Carbon Products Division • St. Marys, Pa.

*Patent applied for

Circle 615 on Page 55





Light industrial furnaces...

Heat treating furnaces, fuel-fired and electric...

Non-ferrous metal melting furnaces, fuel-fired and electric...

Industrial ovens, fuel-fired and electric...

AND NOW

induction melting furnaces....

A full line of sizes and types for steel, cast iron, aluminum, copper, magnesium, silver and their alloys. Designed by a leading European producer of induction melting equipment and proven in hundreds of installations throughout the world. Get the full details from your Hevi-Duty sales engineer or

from Hevi-Duty

Circle 616 on Page 55

HEVI-DUTY

Electric and Fuel-Fired Industrial Furnaces and Ovens

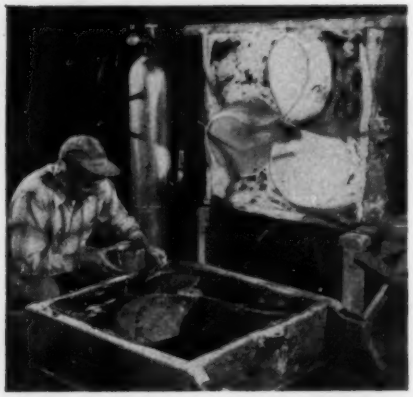
A Division of Basic Products Corporation

Hevi-Duty Electric Company, Watertown, Wisconsin

CORE HARDENING TIME CUT

from 3 hours to 15 seconds*

...WITH PURECO CO_2 "FLASH CURING"



The Pureco CO_2 *Flash Curing* process can mean extensive savings in time and money to you. Hardening time is cut from hours to seconds . . . no costly baking ovens or core driers are needed . . . valuable space is saved . . . more accurate castings with smoother finish result. Mold drying is eliminated . . . rapid production of finished cores expedite rush orders. In-plant handling time is drastically reduced.

For production or custom work.

Pureco can tailor a *Flash Curing* installation to meet your specific foundry requirements —large or small. Cost is low—installation simple.

Have a trial Flash Curing demonstration.

Pureco would like to demonstrate its *Flash Curing* process in *your foundry* under *your working conditions*, with no obligation on your part. Call your local Pureco man or write:

**Actual Pureco test*

PURECO CO_2

PURE CARBONIC

Pure Carbonic Company, A Division of Air Reduction Company, Incorporated
Nation-Wide Pureco CO_2 Service-Distributing Stations in Principal Cities
General Offices: 150 East 42nd Street, New York 17, N.Y.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

HINES chrome-plated PINS AND BUSHINGS

These extremely accurate, uniform pins and bushings, plus their micrometer controlled installation on HINES flasks, provide long, uninterrupted production and fast, smooth pattern draw.

One of many HINES developments contributing to better foundry production

HINES pins are hard-chrome-plated and ground — bushings are case-hardened, hard-chrome-plated and ground.

Tolerances are extremely close, yet there is but little friction between pin and bushing. They draw without chattering, without sticking and without requiring lubrication.

HINES pins and bushings will not rust — flasks are ready for use no matter how long they've been stored.

HINES flasks are machined for pins and bushings in a micrometer-adjusted jig, to guarantee perfect alignment of cope and drag.

Flasks can be equipped to your exact requirements — single or double pins, round, hex or "V" type — with adjustable slides or bushings.

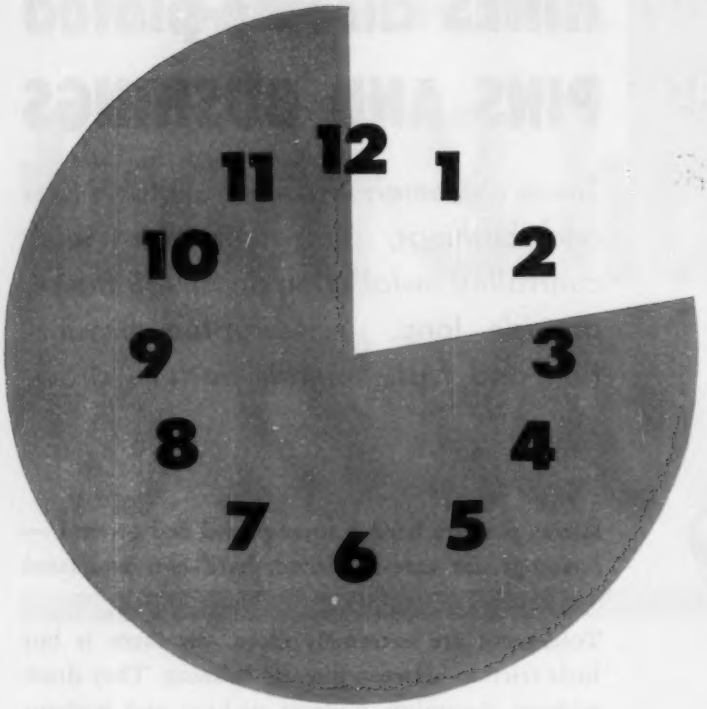
HINES designed and manufactured the *first* hard-chrome-plated and ground pins and bushings over 30 years ago and has been producing them ever since. Hundreds of thousands sold during that time are still giving good service.

WRITE FOR CATALOG FOLDER NO. 211

THE HINES FLASK CO.
3431 WEST 140th STREET • CLEVELAND 11, OHIO

HINES FLASKS

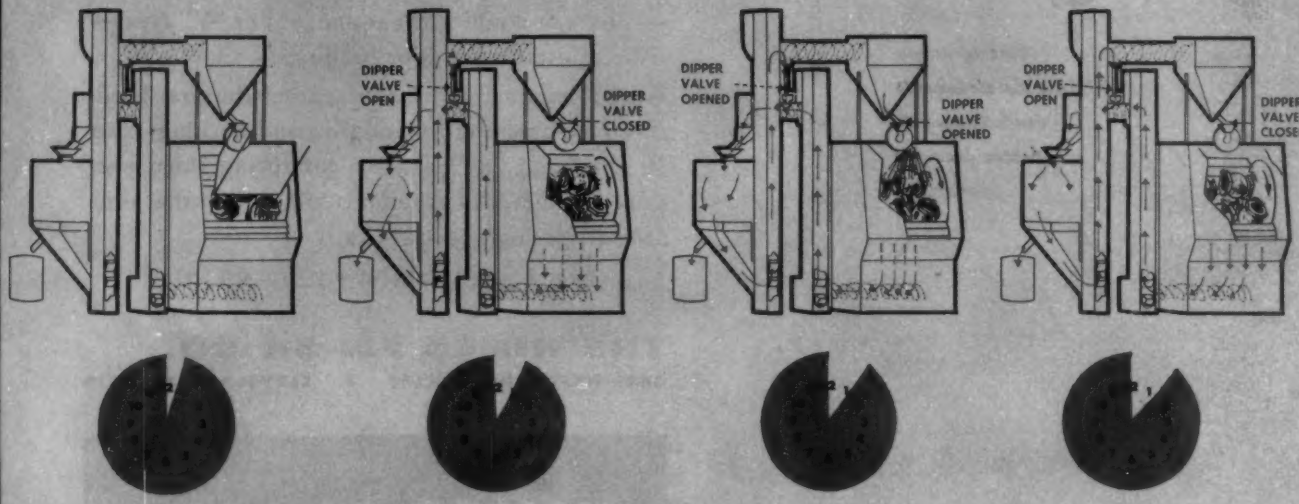
Circle 618 on Page 55



ONLY 13

..FOR CORE

CORE KNOCK-OUT CYCLE



Start—1:00 min.
LOADING—Cooled castings are loaded into the Super Tumblast just as they come from molds.

1:00—4:15 min.
CORE KNOCK-OUT TUMBLE—Loosens sand and cores. Sand removal through Compensating Flow Separator begins immediately.

4:15—5:15 min.
CORE KNOCK-OUT BLAST—Super Tumblast high capacity wheel delivers short blast of steel abrasive, removing majority of sand and cores. Separator immediately begins removing sand from the steel abrasive.

5:15—5:45 min.
SEPARATION—Mixture of sand and steel abrasive is recirculated through the separator until all sand is expelled from the machine.

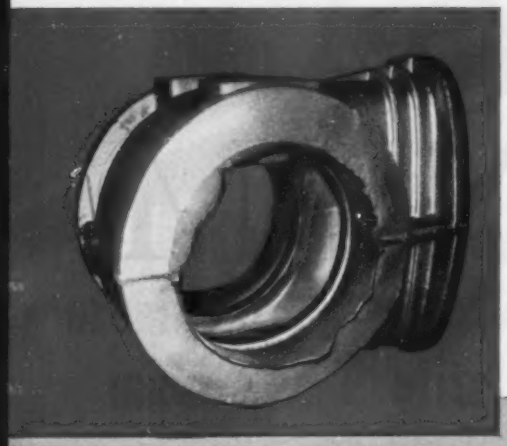
MINUTES

KNOCKOUT AND BLAST CLEANING

In just 13 minutes, T. McAvity & Sons, Ltd., St. John, New Brunswick, is knocking out cores and blast cleaning 1080-pound castings that formerly required as much as two hours each for manual core knock-out alone. This progressive Canadian foundry's Wheelabrator® Core Knock-out Super Tumblast gives them cleaner castings than ever before — *at labor savings of 30 man hours a day.*

The machine, in operation for over a full year, has proved no more expensive to operate and maintain than ordinary foundry blast cleaning equipment — despite the fact that *400 pounds of sand* are discharged by the CFR separator with each load of castings. Abrasive consumption is only *12.4 pounds of S-330 Wheelabrator Steel Shot per wheel hour.*

Wheelabrator alone has the *operating proof* of an abrasive separator capable of handling the sand loads necessary to combine core knock-out and blast cleaning in a single machine. Large or small castings . . . there's a Wheelabrator machine to do your core knock-out and blast cleaning in a single operation. Let your Wheelabrator representative analyze your core knock-out problems and explain the savings you can anticipate with a new Combination Core Knock-out and Blast Cleaning Machine. Write for information today. Wheelabrator Corporation, 505 S. Byrkit Street, Mishawaka, Indiana.



WHEELABRATOR
AIRLESS BLAST EQUIPMENT

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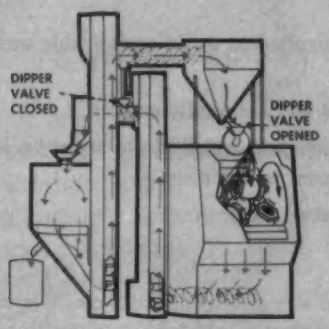
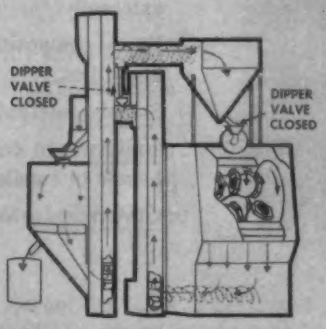
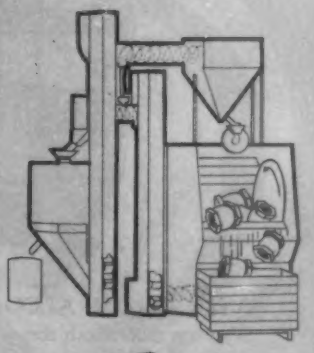
BLAST CLEANING CYCLE



5:45—10:45 min.
CLEANING BLAST — Regular Wheelabrator Super Tumblast cleaning cycle begins. Steel abrasive circulates in a complete cycle through the Separator back to the storage hopper, etc.

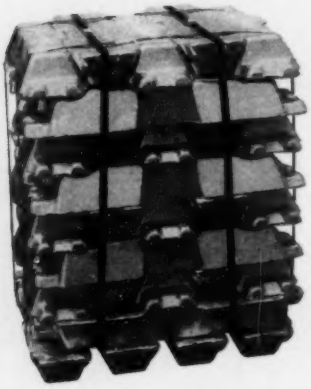


10:45—11:45 min.
POST BLAST TUMBLE — Remaining abrasive is removed from cavities of castings and returned to the recycling system.



11:45—13 min.
UNLOADING—Completely blast-cleaned castings are removed from machine in standard unloading procedure.

BENCH MARKS OF QUALITY IN ALCOA ALUMINUM INGOT



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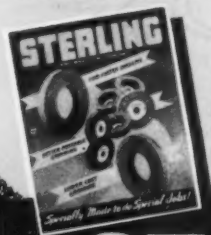

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IMC A REPORT TO FOUNDRIES FROM TOM BARLOW

Clays with character

You might say that clays are like people — each one has a *character* like no other. Never let anyone tell you that the only difference is the hole in the ground they came from.

Take Black Hills Bentonite. It's an extremely strong, uniform and dependable bentonite of the Wyoming type. Here is a clay with lusty personality and a character that has won it a wide circle of friends. The reasons are plain enough: (1) highest dry strength combined with high resilience . . . (2) highest dry strength combined with highest hot strength . . . (3) highest dry strength combined with highest permeability.

And consider the need for resilience in sand — "bounce to the ounce." Of course, we're talking about a sand's degree of *yield* or *give* before breaking (called deformation). When you multiply the deformation value by the green strength, and a factor, the result is the sand value we call resilience. It is the *amount* of springiness or toughness possessed by a sand, and sands lacking this property are said to be brittle.

In this characteristic, Black Hills Bentonite excels over any other type of bond clay. It results in a sand that is *tough*. Less trouble is experienced with difficult lifts, and there is less breakage of corners and edge molds.

Now take green strength. Black Hills Bentonite yields very high green strength (although it is excelled in this respect by Dixie Bond). When we use it as specified, the result is high permeability, with a minimum amount of tempering water, and with less material to handle and less dead clay eventually left in heaps or to be removed.

And there's still more to this character analysis.

Dry strength: Black Hills Bentonite gives higher dry strength than any other type bond clay. This is insurance against cuts and washes, particularly in steel foundry practice.

For green sand or medium weight dry sand work, Black Hills Bentonite provides the highest dry strength per unit of clay used. (In making very heavy castings, however, fire clay binders such as Revivo Bond are usually selected because of the combination of high sintering point with adequate dry strength. But before our sermon degenerates into some kind of "Revivo meeting," let's move along to Dixie Bond, our second character study.)

The strongest bond since marriage was invented

Meet Dixie Bond. (Say "How y'all!") Unquestionably this is the strongest bond clay ever offered American foundrymen. As compared with bentonite, it has high green strength and permeability . . . high flowability and sintering point. Most important is its moderate dry and hot strength, which means easy shakeout with less lumping . . . easier knockout . . . reduced flask maintenance and fewer broken castings. Strong character? Dixie Bond really has it!

Tell me more, you say. (At least I hope you say.) Dixie Bond flows for accurate weighing and reduced hang-up in storage hoppers and feeders, together with improved pneumatic handling. Slurries flow because of minimum viscosity with maximum solids content.

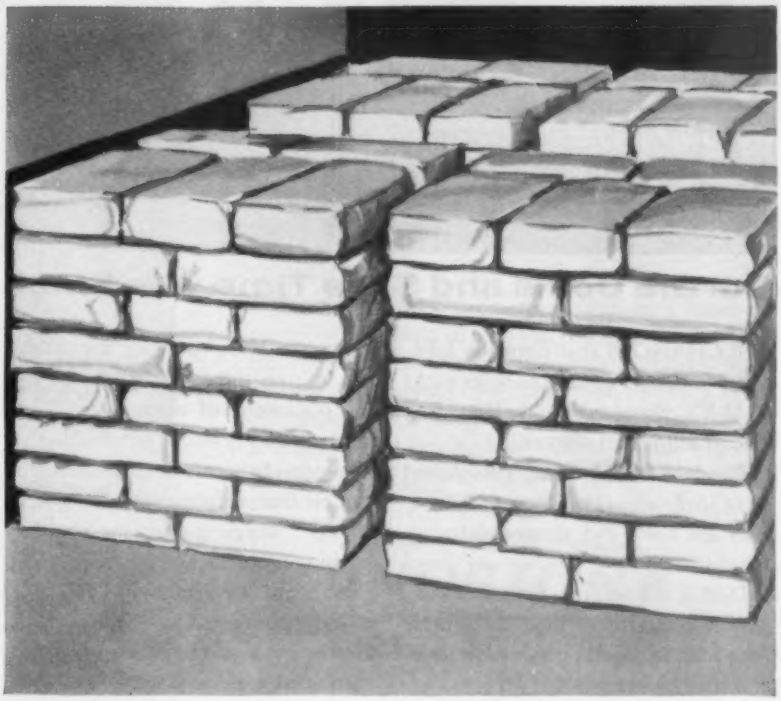
We're by no means suggesting that you start stocking your warehouse with Black Hills or Dixie Bond on the basis of what we've said here. These are only two of many Eastern Clay products that can make foundry sands behave.

Like we've been saying for all these years: no one bonding clay does all jobs equally well. Our service engineers are on the road constantly to assist customers in selecting the proper clay and in using it to their best advantage. These men know foundry conditions first hand . . . apply an extensive background in the study of bonding clays and synthetic sand. When your Eastern Clay service man advises you to try Black Hills Bentonite, Dixie Bond, or still another type additive, he knows whereof he speaks. And his counsel is impartial, as well as cost-free to you.

Why no other bentonites "stack up" with Eastern Clay

This seems a good time to get in a lick for our new *pasted* bags, since you'll find them used for both Black Hills Bentonite and Dixie Bond.

What can be said for a bunch of bags, you ask? Take a good look at the new ECP package. Neatly squared off. No sewn ends. No ears to tear in handling. They'll stack in your warehouse as firmly as bricks. And they need *less space*. That's one reason we say no other bentonites stack up with Eastern Clay. You'll find improved valve closure, too, to reduce leakage substantially. And ECP pasted bags are easier to pick up . . . easier to carry . . . less likely to break. Another advantage is that their design has enabled us to identify the contents on the end of the package, as well as on the body. So they even reduce the possibility of any confusion or error in the use of material.



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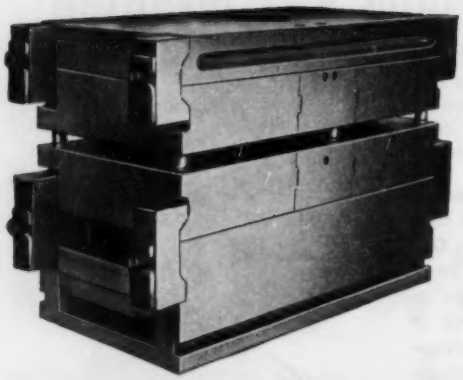

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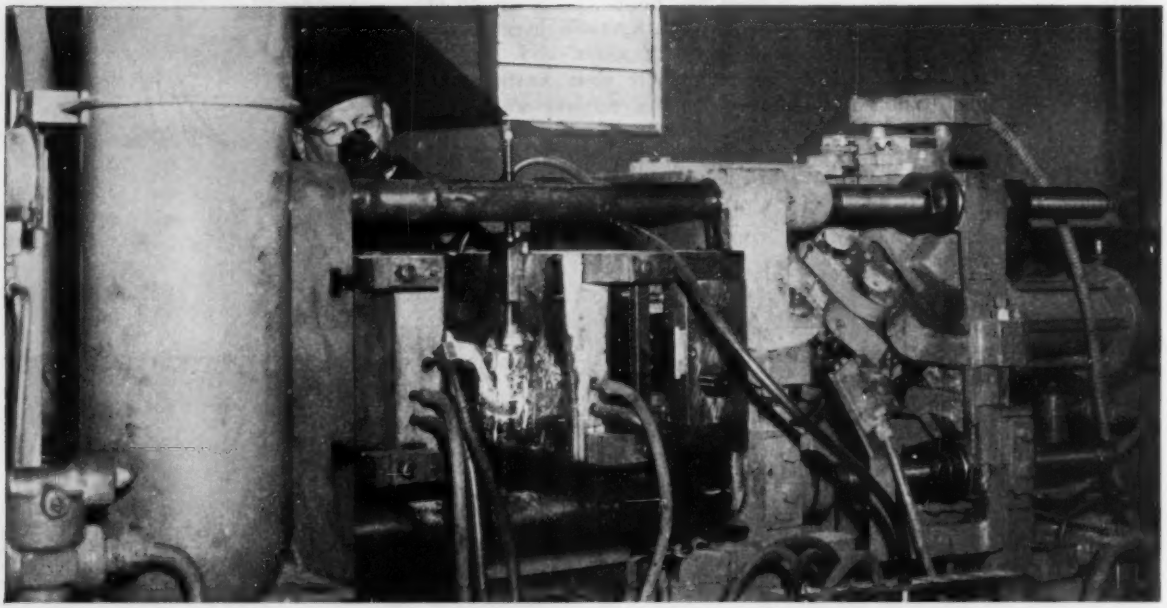

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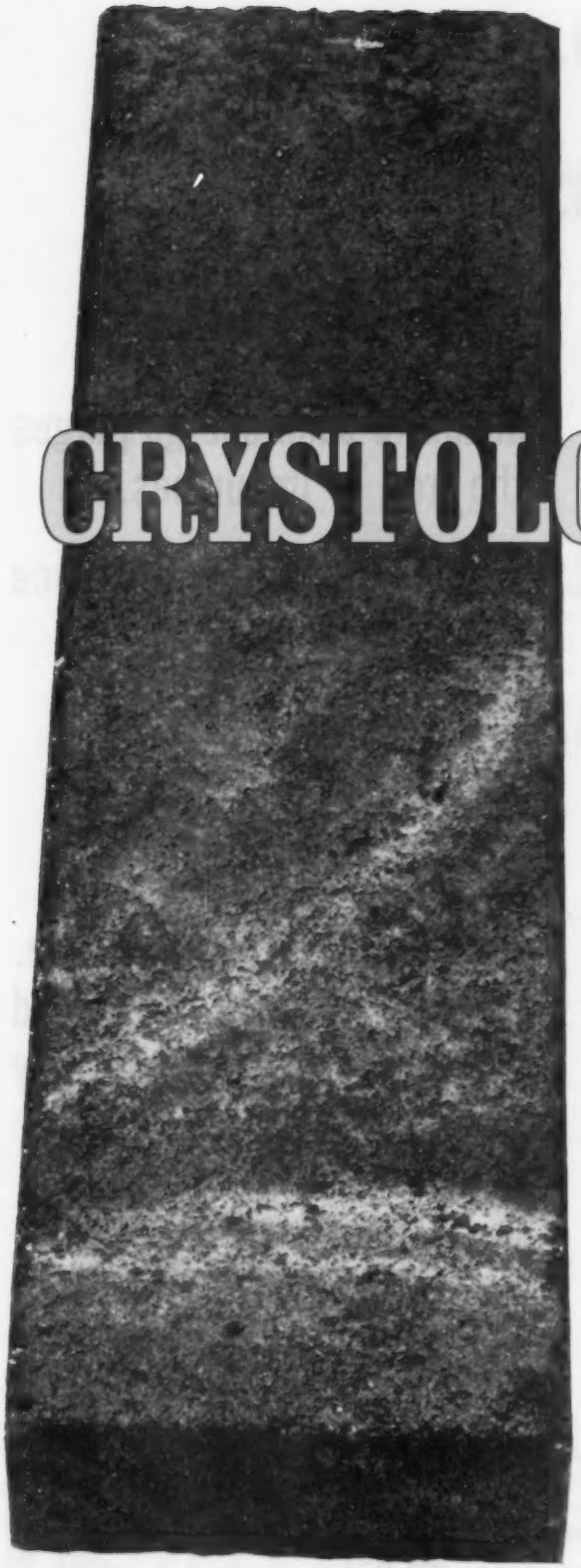

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a

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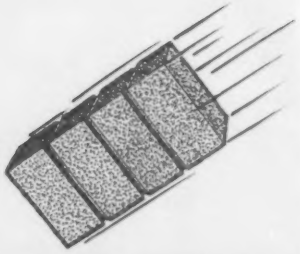

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Time Runs Out

A recent statement by the president of Kaiser Aluminum & Chemical Corp. included this remark: "We began working on aluminum engine blocks in 1951. They are coming into use generally, just this year."

This statement supports the fact that the application of any important material or process is not an overnight development. By the same token, the foundryman who expects to compete successfully ten years from now by offering the same type of material and service he is providing today must assume that there will be no improvement in the products with which he now competes.

The record of the past attests to the folly of this assumption.

Foundries probably have spent too much time and effort attempting to take business from other castings producers while neglecting what should have been done to meet the threat of competing materials. This is the only conclusion that can be drawn from the fact that the index (1947 – 49 = 100) of durable goods production for the last three years averaged 154 and the index for shipments of all types of castings was 97.

Speaking before the recent annual meeting of the Gray Iron Founders' Society, H. W. Lownie Jr. of Battelle Memorial Institute pointed out that known expenditures of gray iron foundries for research represent less than 0.03 per cent of the industry's sales. The average for all manufacturing is 2.1 per cent. Spending for research by the primary metals industry is 0.6 per cent of sales and by metal fabricators it is 1.9 per cent.

Mr. Lownie cited the fact that in Great Britain, which spends, relatively, seven times as much as does this country on gray iron research, production of miscellaneous gray iron castings during the last decade has been steady, whereas shipments in this country have slipped. Coincidence? We doubt it.

These circumstances are not applicable to gray iron alone. For the most part they apply to the entire foundry industry.

There's no denying the progress made in improving casting quality and in intensifying market development work during the last 20 years. But there's also some convincing evidence that the progress was less than adequate.

This progress must be accelerated promptly, because you can't compete in tomorrow's market with today's model. And time is running out.

William G. Reichelt

Editor

Breakability of KNOCK-OFF RISERS

Knock-off risers are effective only when they are designed and used properly. The author discusses proper practice and results of testing various shapes and sizes of knock-off riser cores

By P. K. SANDELL
Foundry Methods Engineer
Tata Locomotive & Engineering Co.
Jamshedpur, Bihar, India

A KNOCK-OFF riser is joined to the casting by a reduced cross-section neck obtained by placing a knock-off or Washburn core at the riser-casting junction. This usually is a thin core made with a high-percentage oil-sand mix. It has a suitably sized aperture to form the neck of the riser, Fig. 1, enabling it to be broken off. Design and manufacture of the core should ensure that the feeder can be knocked-off without harming the surface finish and soundness of the casting.

Correct placement of the core and a suitable sand mixture are vital since improper practice may lead to defects such as sand inclusions, pitted casting surface under the core, metal penetration within the body of the core, and fins at the knock-off neck. The last two defects, especially, affect adversely the breakability of the risers.

Breakability Factors — Successful application of the Washburn core requires that the neck of a feeder should not freeze before the casting as in Fig. 1a. This condition implies that the Washburn neck area and volume should be of sufficient size to provide a solid casting.

If in Fig. 2, E is the effort or force exerted by an inclined hammerblow, both the horizontal and vertical components of this force create a bending moment tending to break the riser from the casting at the neck. The bending moment generated is $M = E_v \times L + E_h \times H + W \times C$. If the blow is struck on the vertical, $M = E' \times C + W \times C$. The thicker the neck, or the greater the length, L, and the taller the riser, the more forceful is this bending moment and hence the easier breaking off the riser becomes.

The force required to break off the riser at the neck is directly proportional to the moment of inertia of the neck section. Thus, some shapes will have better breakability than others because their moment of inertia is smaller even though they have the same cross-sectional area. In more practical terms, breakability is facilitated by keeping depth of the neck, D, as

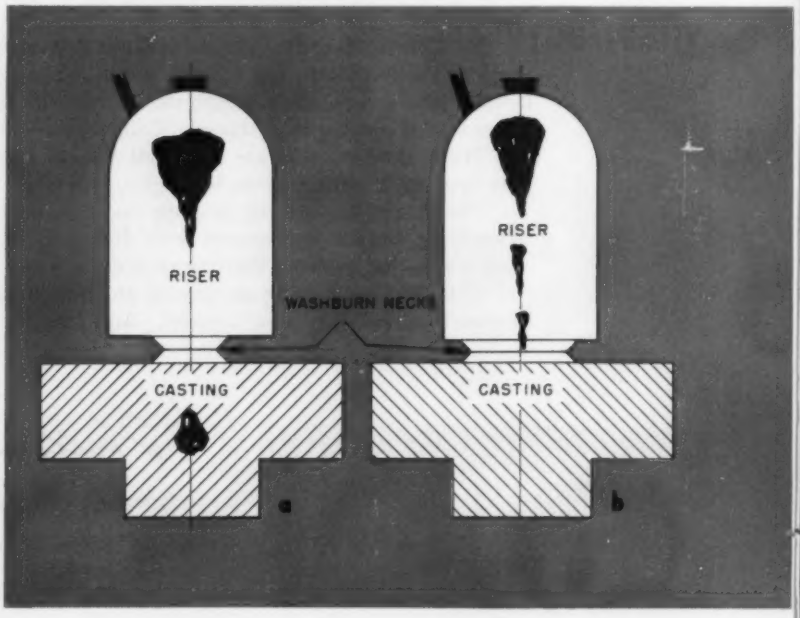


Fig. 1—A neck which freezes before the casting as in A is too small. Neck in B has sufficient solidification time to provide good feeling

small as possible. As an example, a rectangular neck, with its shorter side equal to D, is more suitable than a square neck.

We may conclude then, that consistent with sound feeding performance, the design of the Washburn neck should be based on the following considerations: 1. The Washburn core should be as thick as possible, without affecting the feed metal channels through the core. 2. The cross-sectional area of the neck should be as small as possible for a given shape of the neck. 3. For a given area the moment of inertia of the neck cross-section should be as small as possible.

With these conditions in mind, a series of experiments were formulated to develop a suitable knock-off neck for use with a side riser.

Preliminary Experiments — The test-piece adopted for experimentation, Fig. 4, was of composite design, consisting of three cylinders joined by knock-off necks and fed by a single riser. This arrangement allowed a number of different neck shapes and sizes to be tried under different conditions.

All castings were poured of 0.2 per cent carbon steel at temperatures between 2870 and 2910° F. Experience indicated that the riser used was sufficient to feed to soundness a 4-in.-diam bar 10 to 12 in. long.

Various neck designs were tried and some of the results obtained are summarized in Table I. In each trial the basic criterion to be fulfilled was that the castings had to come out sound. It was only then that breakability of the necks could be compared. Unfortunately, no standard apparatus is available to test comparative ease of riser knock-off. Hence the breakability of the different necks was judged only qualitatively as good, bad, or borderline.

For purposes of feeding, Cylinder 1 can be taken as a riser for Cylinder 2 which, in turn, feeds Cylinder 3. The thermal condition in Cylinders 1 and 2 may be similar, however, and considering them as both risers and castings may not be strictly warranted. In any case, these cylinders lie well within the feeding range of the Williams riser, according to Pellini.[1]

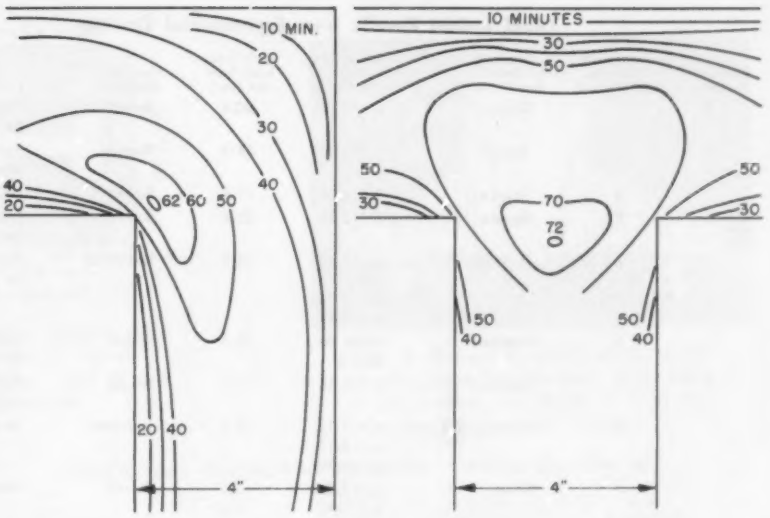


Fig. 3—Each line on these casting solidification patterns shows time and position of an end-of-freeze wave (Brandt, Bishop, and Pellini)

Experimental Results — The first experiment was conducted using the neck sizes detailed in Table I. X-ray examination of the castings showed complete soundness. The fact that the same riser has been able to feed three castings in a row proves that the constriction of the passage between the cylinders does not block the feed metal channels between the pieces and thereby does not affect the soundness of the castings.

Probably, such a result is possible only when the Washburn cores become heated to near the temperature of the metal. In other words, the core behaves in the same way as a mass of metal connecting the castings as far as temperature gradients are concerned. This effect is described as the incandescent effect.

Knock-off riser neck dimensions, thickness and cross-section, given by McNair[2] were selected as a basis

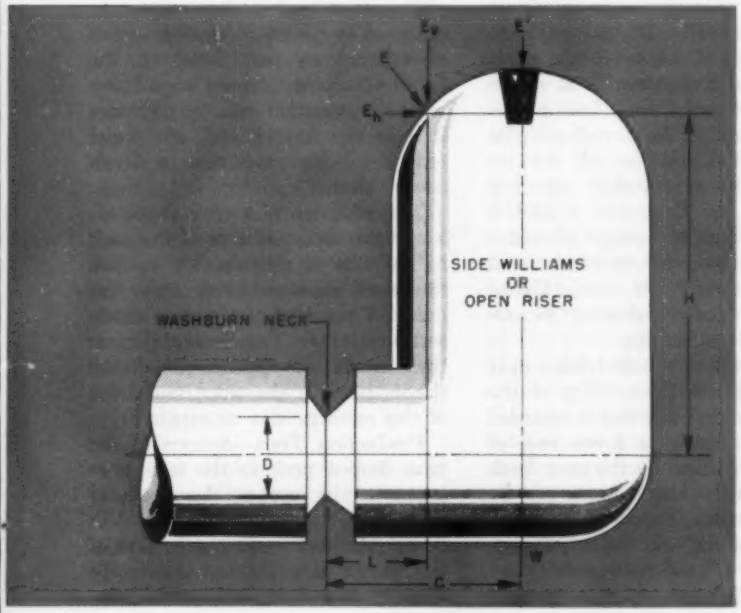


Fig. 2—Schematic drawing illustrates the forces exerted on a riser when subjected to knockoff blows E or E'. Equations for bending moments are given in the text

TABLE I—Test Results from Experimental Castings

Experiment Number	Knock-off Core No. (see Fig. 4)	Shape of Neck (see Fig. 5)	Dimensions, Inches (see Fig. 5)	Neck Area Riser Area (per cent)	Casting Quality	Riser Breakability
1	1	Square	L = 2.36	20.4	Sound	Poor—Had to be cut off
	2	Square	L = 2.36	46.0	Sound	Poor—Riser often cut off
	3	Square	L = 1.18	11.5	Sound	Good
2	1	Square	L = 2.36	20.4	Sound	Poor—Had to be cut off
	2	Inverted T	L_1 = 1.18, L_2 = 1.77, L_3 = 2.36, L_4 = 0.59	28.6	Unsound	Could not be judged
	3	Inverted T	Same As Above	28.6	Sound	Could not be judged
3	1	Square	L = 2.36	20.4	Sound	Poor—Had to be cut off
	2	H-Shape	L_1 = 2.36, L_2 = 0.39, L_3 = 0.59	14.5	Unsound	Very Good
	3	Cross	L_1 = 1.3, L_2 = 0.43	7.7	Sound	Good

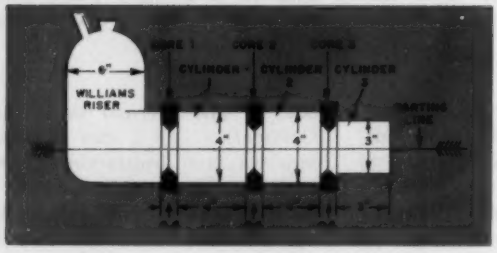
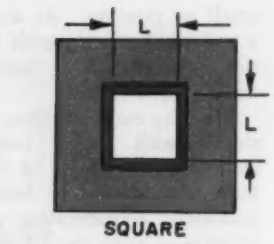
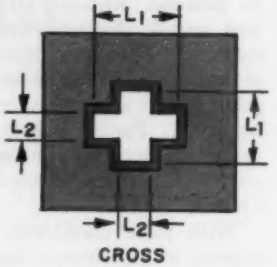


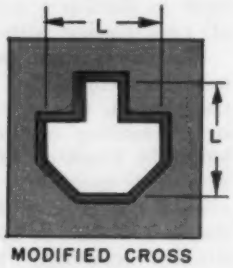
Fig. 4—Test casting employed three knock-off cores located as shown in this layout



SQUARE



CROSS



MODIFIED CROSS

for the test work which was done.

A greater thickness than that prescribed by McNair (which is 10 per cent of riser diameter) was used for Cores 1 and 3 so that the risers could be broken easily. Results obtained indicate that a core thickness equal to 10 per cent of the riser diameter plus 0.2 in. is quite safe.

A thicker core has a number of advantages in addition to being conducive to easy breakability. It also gives a cleaner riser-casting junction and involves less danger of metal penetration into the body of the core. Also, the connection can be cut easily, if that should be necessary. Furthermore, the danger of a pitted surface occurring on the casting is reduced because of less core incandescence.

Increasing thickness, however, affects adversely the solidification of the knock-off neck. This could have been offset by enlarging the aperture of the knock-off core. But this makes breaking the neck difficult. Tests therefore were conducted with cross, inverted T, modified cross, and H-shaped necks, all incorporating re-entrant corners or right angled tips which would, it was assumed, attain a temperature higher than the adjoining edges. The resultant localized concentration of heat should be able to retard solidification of the adjacent neck regions.

The effect of the re-entrant angle was seen in Experiment 2 in which inverted-T necks were utilized at Cores 2 and 3. Both radiographic and visual inspection of the resultant castings revealed complete soundness for Cylinders 1 and 3 but a hairline shrinkage of about 0.04 in. diam was evident to a depth of about 0.8 in. inside Cylinder 2 at a point adjacent to one of the right-angled tips.

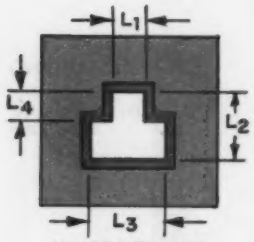
Occurrence of this shrinkage near the tips upheld the validity of the assumption that freezing is retarded at corners due to a lower rate of absorption of heat by the core. Such an explanation also is borne out by the solidification curves obtained by Brandt, Bishop, and Pellini, Fig. 3, for T-section sand castings.[3]

Two additional experiments were made using an H-shaped and a cross-shaped neck designed to exert more pronounced corner effect on the knock-off junctions. Neck dimensions and test results are detailed in Table I.

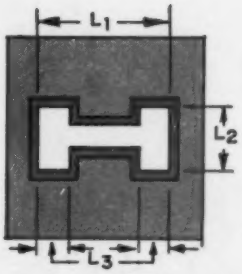
The H-shaped neck section was designed to have a reduced modulus of rigidity so that breaking the knock-off connection was easy. However, the resultant casting, Cylinder 2, was not sound and additional tests are being conducted to develop this shape.

The adoption of a cross-shape allowed the sectional area of the neck to be reduced considerably so that the neck cross-sectional area was only 7.7 per cent of the riser cross-sectional area. The breakability of these necks was the best of all the shapes tried in the tests; soundness of the castings was unimpaired.

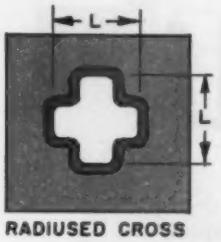
Production Tests—Success of the cross-shaped neck in the test-pieces prompted its use at the necks of two 5.9-in.-diam, 8.85-in.-high Williams siderisers feeding a portion of the flange of a 1⅓-ton locomotive casting, Fig. 6. A number of tests



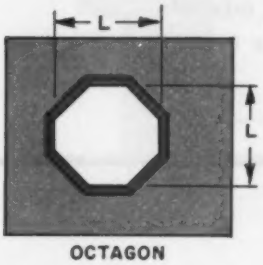
INVERTED TEE



H-SHAPE



RADIUSED CROSS



OCTAGON

Fig. 5—These shapes were used as necks for knock-off cores. Tables I and II give the dimensions used

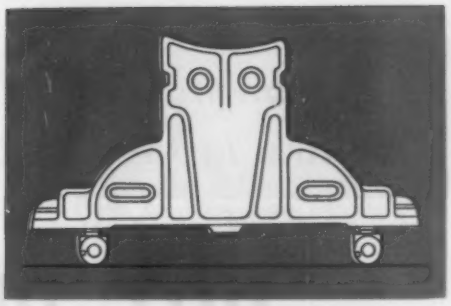


Fig. 6—Knock-off cores were tested on this locomotive casting. Side riser 6 in. in diam and 8.85 in. high fed into the 2.4 in. thick casting

TABLE II—Test Results from Locomotive Castings (See Fig. 6)

Neck Shape (see Fig. 5)	Dimensions, Inches	Neck Area Riser Area (per cent)	Casting Quality	Riser Breakability
Cross (radiused)	L = 2.13	8.2	Unsound	Good
"	L = 2.20	10.7	Sound	Good
"	L = 2.36	11.5	Sound	Borderline
Modified Cross	L = 2.17	11.8	Sound	Good
Octagon	L = 2.17	13.4	Sound	Poor—Had to be cut off
Inverted T	L_2 = 2.36 L_3 = 2.36	16.0	Sound	Poor

were made and the results indicated that the sharp tips of the knock-off cores are liable to be broken off by the impact of running metal during pouring. To avoid this, the tips were radiused or rounded off and properly reinforced.

Dimension L and the radius of the tips are critical for avoiding shrinkage but a neck area of 11 to 12 per cent of the riser cross-section appears to produce the required casting soundness along with reasonably improved breakability.

Other neck configurations were tested and results are shown in Table II. Care had to be taken in proportioning the inverted T neck to obtain a proper balance between casting soundness and easy riser breakability. Table II shows that though a casting may be sound, the knock-off neck may not be broken easily.

Correct molding practice[4] and proper sand mixtures are essential for a successful knock-off riser practice. Fineness and conductivity of the sand used, the percentage of linseed oil used in the mix, and the presence of other binders affect incandescence of the core.

Two different sands, Rajmahal silica and zircon of a finer screen, were used with linseed oil varying from 3 to 5 per cent during the tests. No conclusions were reached on the effect of different compositions. Cores made from the silica sand mixture contained 0.8 per cent dextrin and 3 to 4 per cent linseed oil. They were dried at about 390 to 480° F for 1½ hr. Scratch hardness varied between 0.7 and 0.85 Dietert.

Conclusions—The results can be summarized as follows: 1. For easy breakability, the knock-off core should be as thick as possible within the requirements of sound feeding. Tests indicate that a thickness of about 10 per cent of the riser diameter plus 0.2 in. is safe. 2. Adoption of a radiused-tipped, cross-shaped neck of about 12 per cent of the riser cross-section provides best breakability without affecting the soundness of the casting. This has been proved only for a side riser.

Further trials are being conducted to investigate the incandesecent effect of Washburn coring. It also is proposed to investigate through actual temperature measurements, whether the combustion of any of the core binders can cause heat to flow from the core to the liquid metal it encloses.

The author expresses thanks to the management of Tata Locomotive & Engineering Co. Ltd., Jamshedpur, particularly to Sri N. G. Chakrabarti, works manager of its foundries, for permission to publish this paper. Gratitude also is expressed to Sri S. N. Chatterjee for helping with the sketches.

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Fundamentals of Melting in the

By A. C. BUESING
Vice President
Brown Metals Inc.
Elyria, Ohio

HOT BLAST CUPOLA

Here's a comparison of hot blast and standard cold blast cupola performances. In addition, the article deals with the advantages and applications of high-temperature blast for the cupola

● BEFORE discussing the effects of hot blast on cupola performance, this article will review present knowledge of thermal reactions in a standard cold blast cupola. Although knowledge of this subject is not complete, reviewing what is known will permit a general understanding. This knowledge is drawn from both published works of researchers and practical experience of cupola operators.

Air Flow Pattern—First, consider the cross-sectional area of a cold blast cupola (Fig. 1) on a plane with the tuyeres. As air leaves the tuyeres, it strikes the coke bed. Distribution of the air from this point is controlled by the placement and size of the charge material and the height to which it is stacked in the cupola.

Normal mechanical charging results in a charge that is packed tightest in the center of the cupola and has voids next to the cupola lining. As a result, when the air is blown from the tuyeres it flows into areas with the least resistance—the area next to the cupola lining.

Tight packing in the center could be avoided by hand charging. If the charging crew placed layers of pig iron next to the lining and the coke and limestone in the center, fewer voids would occur in the lining area.

In any case, the incoming air must make a right-angle turn from horizontal to vertical. Velocity of the air through the tuyere and the size of the voids in the coke bed determine the amount of horizontal penetration and the curve followed by the air in its change of direction. Ordinarily, the blast air will not penetrate horizontally to the opposite wall of the cupola. By watching incandescent coke through the tuyere peephole, the dynamic state of the coke and voids preventing such penetration can be noted. This means that the voids which allow the air to pass are continually changing in volume and in the degree to which they restrict passage of blast air.

When air is rammed through a water-cooled tuyere at high velocity, however, it may reduce the size of coke directly in front of the tuyeres at an accelerated rate. Under these circumstances, small pieces of coke have been observed floating in a large void area in front of the tuyere. It is conceivable that if the air velocity through the tuyere were raised to 30,000 fpm or more, it would be possible to erode large openings in the otherwise normal packing of the incandescent coke bed.

Heating Necessary — When air leaves the tuyere of a cold blast cupola, it is at room temperature—about 80° F. Before this air can take part in the combustion of the incandescent coke, it must be heated to approximately 1240° F as reported by Leyshon. The air must penetrate several inches into the coke bed before it becomes heated sufficiently to react. An analysis of the gas for several inches around the tuyeres shows nearly 20 per cent oxygen and less than 1 per cent CO_2, as in Fig. 1. Since air normally contains about 21 per cent oxygen, this indicates that almost none of the oxygen reacts while it is close to the tuyere.

The temperature of the blast air increases quickly after it rises above the tuyere area. A mixture of free oxygen and CO_2 is found just above the tuyeres and near the lining, but more CO_2 gas is formed as the blast air rises and attains ignition temperature. When all oxygen has

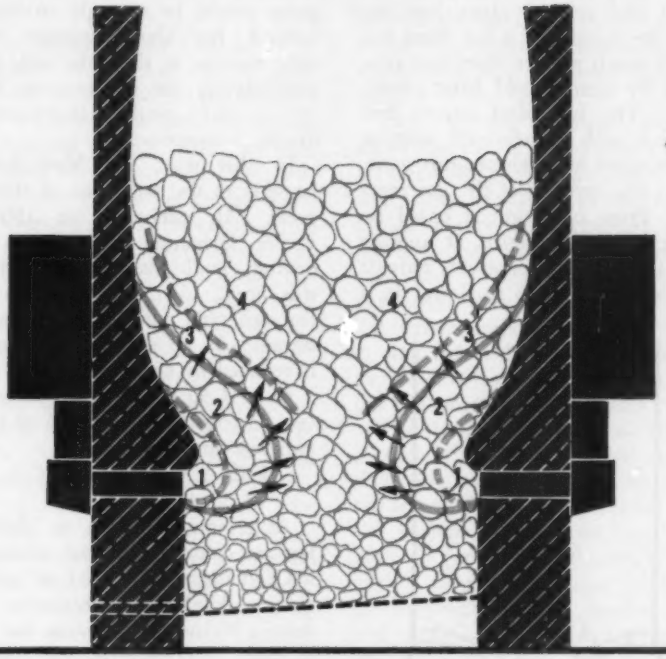

Fig. 1—Zones of various gases in a cold blast cupola: 1. Max free oxygen. 2. Max carbon dioxide with some oxygen. 3. All oxygen eliminated, max temperatures. 4. Faster conversion from carbon dioxide to carbon monoxide

been consumed, the gases contain approximately 16-17 per cent CO_2 and 6 per cent CO.

The area of maximum CO_2 content has the highest temperature. This area resembles a conical ring extending upwards inside the cupola from the tuyeres to as high as 27 to 36 in. Reference to a shape for the high-temperature zone does not imply exact physical dimensions because the high temperature zone is dynamic. Its shape is altered by such factors as blast rate, tuyere dimensions, coke size, internal diameter of cupola melting zone, stock size, and charging practice.

Boundaries Vary Widely—Probes inserted through the cupola shell and lining have indicated temperature variations in the high-temperature zone. Tests have shown a normal high-temperature zone in the areas above the tuyeres, but on the same plane a cold area was surrounding a second hot zone in the center of the coke bed. This means the high-temperature zone boundaries vary in depth within wide limits.

The mechanism of oxygen combustion in the high-temperature zone of the cupola bed is as yet imperfectly understood. Two primary reactions occur, one forming CO_2 and the other forming CO. In the area where all O_2 has been consumed and CO_2 concentration is 17 per cent, the theoretical gas temperature—from the combustion temperature of solid carbon and a blast temperature of 32° F—is calculated to be 3758° F. However, the actual gas temperature has been reported to be only as high as 3100° F. The variation between theoretical maximum and actual temperatures is due in part to radiation of heat to the cupola lining, plus heat transferred to the droplets of molten iron and slag and, to a lesser degree, heat lost to moisture in the blast air.

The combustion reactions are heat-producing reactions. They occur essentially as follows: $C + O_2 = CO_2$; $C + \frac{1}{2}O_2 = CO$; $CO + \frac{1}{2}O_2 = CO_2$.

The last reaction is thought to take place in voids between fuel particles. At the highest temperature, CO_2 reacts strongly with carbon in the absence of oxygen and the following reaction occurs: $CO_2 + C = 2CO$.

Gas analyses have indicated that a column of CO is present in the center of the cupola coke bed which takes the form of an inverted cone inside the ring of high CO_2 concentration. The highest concentration of CO is found in the center of the cone and this same area shows the lowest temperature.

Rapid Temperature Drop—The CO-forming reaction is endothermic or heat absorbing, and the temperature of the gases decreases rapidly as they rise above the plane of maximum temperature. The rate of this reaction depends strongly on temperature, and the controlling mechanism changes from one of mass transfer at temperatures above 2550° F to chemical control below about 2000° F.

In the transition range, the rate probably is controlled by the rate of diffusion of the reacting gas into, and the products out of, the capillary system of the fuel. In effect, as the coke bed temperature is increased, the production of CO just beyond the plane of maximum temperature is increased. This item becomes more important when effects of hot blast are discussed.

Temperature of the ascending gases finally reaches a point where the temperature differential between the gas and fuel surface is too small for sufficient heat transfer, so the endothermic reaction ceases. Gas composition at this level is approximately the same as that of gas leaving the stack.

No attempt has been made in this review to explore the variables encountered in cold blast practice. Specific items such as cupola bed heights, coke ratios, melting rates, metal temperatures, etc., have not been mentioned. The discussion has been limited to some of the basic fundamentals concerning the

thermal reactions of cold blast cupola operation.

Hot Blast Reactions — With this background on cold blast operation, the effect of hot blast can be better appreciated. For this discussion, air preheated to 1000° F will be considered. The first big difference between the two operations is the increased blast velocity of the hot blast through the cupola blast piping, downcomers, and tuyeres. Blast air is measured on the cold side prior to entering the preheating unit. When temperature of the air is raised to 1000° F, it expands in volume 2.78 times. If 10,000 cfm of air at 72° F were to pass through six 6-in. tuyeres, it would move at a speed of 8500 fpm. If this same amount of air were heated to 1000° F and passed through the same tuyeres, it would have a velocity of 23,600 fpm.

Since the gas reactions depend on intimate contact between the carbon and oxygen, it would seem that the decreased contact time due to higher blast velocities might affect the reactions. However, the more violent turbulence, due to the increased gas velocities, produces a greater number of actual contacts by violent scrubbing between the reacting atoms. This action tends to offset the reduction of contact time between air and fuel.

In general, the 1000°F temperature air passing through the tuyere opening is affected by the same physical characteristics—coke size, stock size, etc.—as the air in the cold blast cupola. In both cases the air will seek a major flow path around the periphery of the cupola, all other conditions being equal. The increased air velocities produced with hot blast, however, give somewhat deeper penetration into the coke bed.

Air heated to 1000° F needs only a small increase for it to reach the temperature required for reaction with the carbon. Thus, the space traveled by the preheated air through the incandescent coke bed before being converted to CO_2 is shortened. Since the air reacts with less travel, there is a much smaller zone of free oxygen above the tuyeres, as shown in Fig. 2. This lack of free oxygen eliminates the cooling zone near the tuyeres and promotes higher coke bed temperatures.

More CO_2 Present—The percentage of CO_2 present in both a horizontal and vertical plane just beyond the tuyere in a hot blast cupola is much greater than that produced by similar cold blast conditions. The hot blast cupola bed operates with a relatively narrow and compact high temperature zone, due to the speedup of the gas reaction. From observations based on lining burnout patterns, it appears that the high-temperature zone is approximately 10-16 in. lower in a

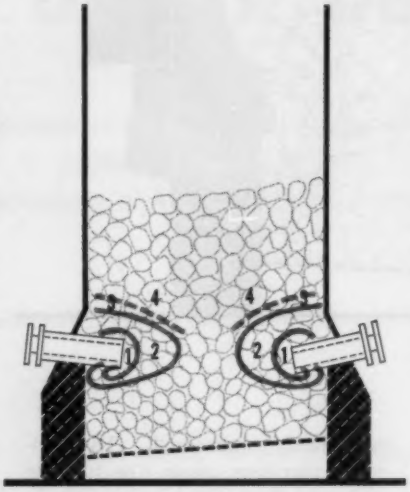

Fig. 2—Zones in a hot blast unlined, watercooled cupola: 1. Maximum free oxygen. 2. Max carbon dioxide. 3. All oxygen eliminated, max temperatures. 4. Faster conversion of carbon dioxide to carbon monoxide

hot blast cupola. Thus, the gas reaction is compressed into a smaller area, requiring less fuel surface contact for the same Btu output. This also produces an increased coke bed temperature.

As mentioned before, the actual temperatures attained with cold blast are 650° F below the maximum theoretical temperature. With air heated to 1000° F for the blast, the calculated theoretical temperature would be 4500° F. For the same reasons as stated for cold blast, this theoretical maximum is not attained. Instead, actual minimum temperatures will be 12-15 per cent below the theoretical maximum.

Maximum gas temperatures would be produced if complete combustion took place and the stack gases consisted of 100 per cent CO_2 and no CO. However, these gases would be strongly oxidizing. Instead, hot blast promotes high temperatures in the coke bed, thus precipitating the gas reaction $CO_2 + C = 2CO$, resulting in a more reducing atmosphere.

In this way, hot blast brings benefits to the well area of the cupola. Air preheated to 1000° F favors formation of CO, so reducing conditions are prevalent in this area. Any oxides which fall through this zone tend to be reduced. As an example, iron oxide is reduced by this reaction:

$C + FeO = Fe + CO$, which can be considered the sum of these two reactions:

$$FeO + CO = Fe + CO_2$$
$$C + CO_2 = 2CO$$

At temperatures up to 3240° F, ferrous oxide is reduced whenever a CO/CO_2 ratio of 10:1 or greater exists. Higher temperatures promote a higher ratio because the CO_2 is more reactive with the coke in hotter areas. Consequently, CO/CO_2 ratios of 10:1 or greater do exist.

Temperature Effects — Higher temperatures also favor the reduction of silica to silicon in much the same manner as ferrous oxide is reduced. These reactions occur when the slag and oxide-coated metal droplets pass through the high CO content atmosphere in the well. In the slag, the oxides are reduced by direct contact with the carbon in the coke.

Lower oxidation losses result not only from the reducing reactions just explained but also from the conditions existing in the stack. The higher temperatures promote the formation of CO in the stack, and with the higher CO/CO_2 ratio there is less oxidation of silicon, manganese, and iron in this region of the cupola.

The increase in bed temperature, due to preheated blast air, influences the physical condition of the slag by increasing its fluidity. In the cupola melting zone, the fluidity of the slag is increased to a point where it does not adhere to the coke surface and form an insulating blanket. This exposes more of the surface of each lump of coke so there is greater reactivity between the incandescent coke and the gases. In the well, the more fluid slag has

a greater affinity for sulfur, resulting in lower sulfur content in the iron.

The Water-Cooled Cupola — A discussion of hot blast cupola melting fundamentals would not be complete without some mention of the water-cooled cupola with protruding water cooled tuyeres. This relatively new cupola design has been instrumental in the development of the present high temperature, externally fired, hot blast units. Today's air preheaters are engineered to produce cupola blast air temperatures of 650° F, 850° F, 1000° F, 1200° F, and 1400° F.

Prior to the use of water-cooled cupolas, hot blast temperatures above the 800-850° F range were not practical. The higher temperature of the hot blast created the problem of extreme lining erosion and tuyere plate burn-back because of the increased bed temperature. The cupola shell in the tuyere area also was exposed to excess temperatures. Lining and tuyere repair costs were not economical for heats lasting 8-16 hours. However, a standard-lined cupola could be operated with 1000° F hot blast if the heat was limited to two to three hours.

Early attempts at water cooling the cupola shell and operating with cold blast air encountered high losses due to oxidation of silicon, manganese, and iron. At the same time, another problem arose. This was the formation of a secondary melting zone, situated 5-7 ft above the tuyeres.

The secondary melting zone resulted from the passage of the oxygen in the blast along the relatively lower temperature water-cooled shell. A portion of the oxygen leaving a standard tuyere could not gain sufficient temperature in the normal distance to convert to CO_2 or CO because of the cooling effect produced by the water-cooled shell. The gas reaction finally did occur, but at a much higher elevation in the cupola bed. Usually this point was 5 to 7 ft above the tuyeres near to the periphery of the shell.

The upper melting zone produced gas temperatures sufficient to melt small amounts of iron and slag. Material adhered to the cupola shell and, as the heat progressed, the ring of slag and oxidized metal grew toward the center of the cupola. This condition interfered with normal movement of the stock, constricted the air flow pattern, aggravated the oxidation of silicon and manganese, and increased the FeO content of the slag.

This specific problem brought about the use of blast-furnace type, water-cooled projecting tuyeres. The cold blast air leaving the water-cooled tuyere is discharged at a point deeper in the incandescent coke bed. The result is that the gas reaction time is accelerated by the higher temperature and a smaller amount of free oxygen remains as the air makes its way back to the periphery of the cupola shell.

The Unlined Cupolas — Advent of the unlined water-cooled cupola shell eliminated the uncertainty of refractory life and permitted the use of high-temperature hot blast. Use of preheated air offsets the initial temperature losses produced by the water-cooled cupola shell and tuyeres. It enables the cupola to maintain higher molten metal temperatures and better reducing conditions with less coke. High-temperature hot blast is particularly useful in the production of ductile irons which require controlled high carbons, low sulfurs, and low FeO slags.

How high can heated blast temperatures go? The U. S. Bureau of Mines is operating an experimental blast furnace at Bruceton, Pa., with hot blast temperatures of 2475° F. Brown Metals Inc. has been examining the production problems of a so-called exotic temperature cupola air preheater. However, the cost of one externally fired unit designed to deliver 500 cfm at 2200° F for a 12-in. cupolette is rather high.

The problem of cost is critical when the economic factors are considered for all theoretical possibilities. Cupola blast piping and wind drums fabricated from carbon steel are sufficient for use with 1000° F hot blast. Plain carbon steel cannot be used for 1200° F hot blast; with the higher temperature blast stainless steel must be used. The more costly fabrication, plus greater investment in the hot blast unit and valves, require a thorough comparison of the total cost and dollar savings for a specific operating problem or goal.

When exotic temperature hot blast is considered, even stainless steel no longer can be used. Instead, refractory insulation is required on the inside of blast piping, wind drums, and cupola downcomers, and valves would have to be water-cooled. Additional research is needed to determine if the cost of blast temperatures above 1200-1400° F would be justified by the results obtained.

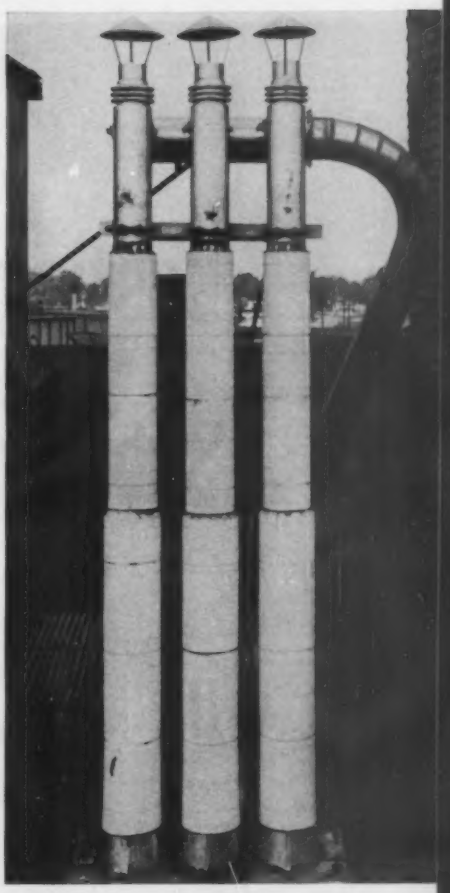

Fig. 3—Heating installation for a hot blast cupola. Blast air is heated in these pipes on its way to the cupola

Acknowledgment—This article is based in part on the following studies:

"General Principles of Cupola Operation," British Cast Iron Research Association Report No. 482 by H. J. Leyshon.

"Inter-relation of Combustion and Metallurgical Reactions in the Cupola" by D. Fleming, *Foundry Trade Journal*, Sept. 17, 1953.

"Cupola Developments"—Third report of Subcommittee TS 43, Technical Council, Institute of British Foundrymen, *The British Foundryman*, March, 1960.

"Review of Foundry Cupola Gases and Temperatures" by A. W. Belden, Bureau of Mines Bulletin No. 54. Review of article with modified data by H. W. Lownie Jr.

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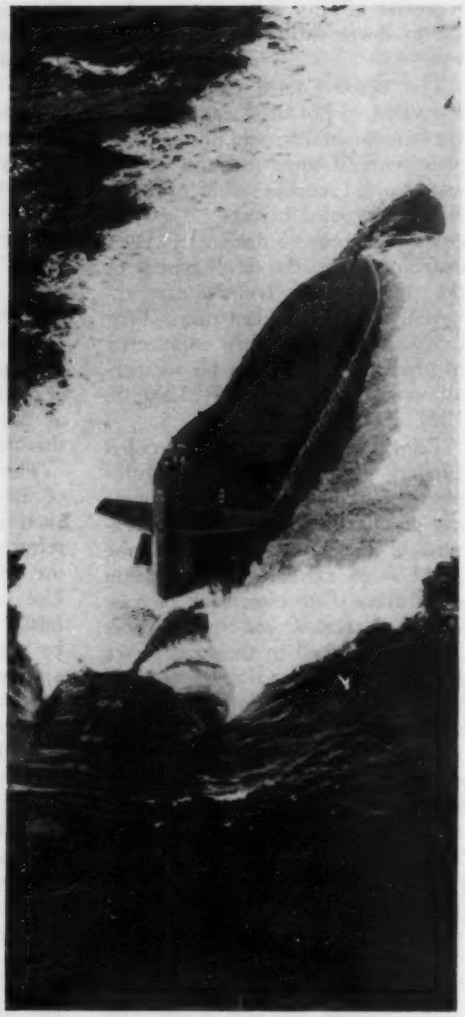
Casting Submarine Parts in CO_2 Process Molds



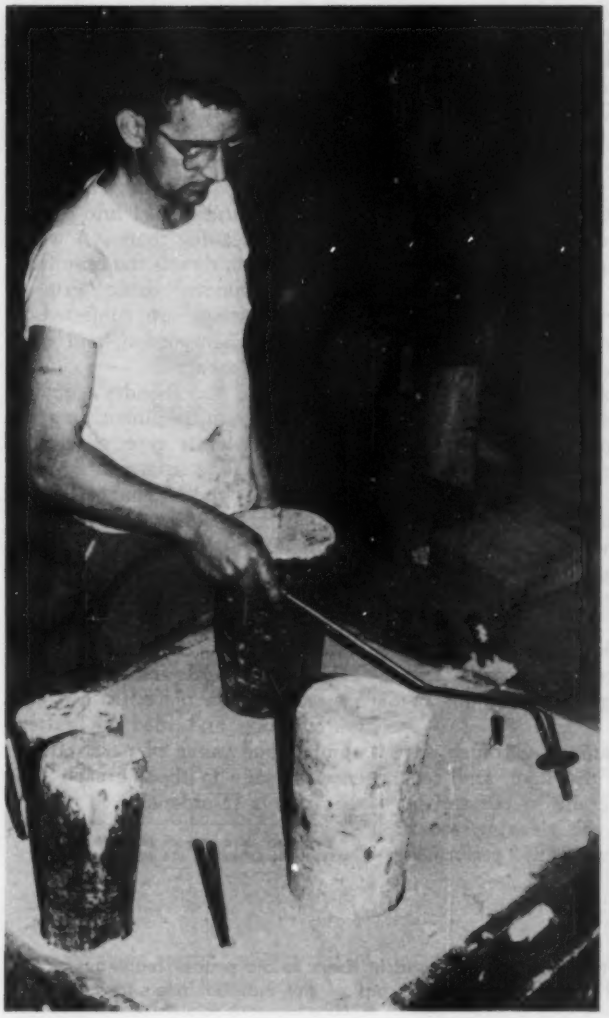
The nuclear-powered submarine, George Washington, cruises through waters of Long Island Sound on first trials

At this foundry, production of castings of one kind seldom exceeds three. Often they are required on short notice. The CO_2 process satisfies the requirements of low production and rush jobs

By ROBERT H. HERRMANN
Associate Editor

● EIGHTY per cent by weight of castings produced at Electric Boat Div., General Dynamics Corp., Groton, Conn., are cast in sodium silicate-bonded sand molds cured with CO_2. Use of the CO_2 process fits in with the foundry's special needs and problems.

All castings made at Electric Boat are used in submarines built by the company. The cast components are used in new ships or as repair parts for submarines in service. In either case the number of castings of a kind seldom exceeds three. Often, the repair parts must be produced on short notice.



Holes are punched in molds to prepare them for gassing. CO_2 is introduced by a pipe at the end of a hose. Then holes are filled with fresh sand mix

Extensive use is made of chills, as shown here, to promote soundness in critical casting areas. The worker is cleaning mold with a vacuum hose

The CO_2 process satisfies the requirements of low production and rush jobs. The comparative simplicity of moldmaking with sodium silicate-bonded sand also satisfies another problem of the foundry—a shortage of skilled molders. Two factors contributed to this problem.

A short time ago the company instituted a forced retirement program which went into effect over a one-year period. Many skilled workers were lost as a result, and practically no younger men were being trained. The foundry hasn't had an apprentice in seven years. Some skilled workers have become available as the result of the closing of other foundries in the area, but they are too few to fill the gaps created by normal turnover of workers.

Wide Size Range — Most of the castings produced by Electric Boat are for corrosion-resistant applications. Many castings, used in pumps, valves, and piping, must meet pressure-tight requirements. About 25 brass and bronze alloys and three aluminum alloys are poured. Castings range in weight from a few ounces to 7000 lb, monthly production of cleaned castings running about 120,000 lb.

Sodium silicate-bonded sand is used for all floor-molding work. Flask sizes are from 20 x 20 in. up. Molding sand is prepared in a skip-hoist-charged muller mounted about 3 ft above floor level. Sand mixes for brass and bronze castings are produced in 1000-lb batches. They consist of three parts 110 AFS fineness sand and one part 55 AFS fineness sand with 5 per cent proprietary binder. Sand mixes for aluminum castings consist of all fine sand with the same amount of binder.

After a three-minute mulling time the sand is discharged to a front-end loader for delivery to

boxes on the molding floor. Sand in the boxes is covered with moist burlap and has a usable life of about 2 hr.

Molds are hand rammed and are prepared for gassing by punching holes in them with a rod. CO_2 is introduced at 20 psi by a pipe at the end of a hose. Each hole is gassed about 5 seconds. Every effort is made to avoid overgassing because the sand becomes mealy. The foundry has experienced metal penetration with mealy sand.

When the mold is gassed, the holes are filled with fresh sand mix, and the cured mold halves are drawn off the pattern. Both halves of the mold are sprayed or brushed with an alcohol-graphite mixture, which is ignited to dry.

Almost no sodium silicate-bonded cores are used because of their short shelf life, due mainly to moisture pickup. Oil sand mixes are used for baked cores and for downsprue inserts. Gypsum or exothermic material sleeves are used for risers. In addition, the risers of copper-nickel and aluminum-bronze castings are topped with rice hulls to delay solidification and aid feeding. Exothermic materials also are used.

Metal Handling—Melting equipment includes five high-frequency induction furnaces—one of 2000-lb capacity, two of 1000, and two of 500—for a total nominal capacity of 5000 lb. Chemical, physical, and mechanical test bars are poured from each heat.

Also, Brinell tests are performed on samples of high tensile strength alloys such as copper-nickel, aluminum-bronze, and aluminum-manganese-bronze. Company metallurgists have determined that a close relationship exists between the Brinell hardness number and the yield strength of these alloys. The test is performed before the heat is tapped. Compensation for any variation in hardness can be made with additions to the melt before the furnace is tapped.

When the molds are poured, a metal tag stamped with the heat number and alloy analysis is inserted in the still liquid alloy of the sprue. Information on the tag helps in the quality control program and in segregating gating metal for remelting.

Castings Cleaning—Castings are broken out on the floor and carried by bridge crane to the end of the shop near the cleaning room. No cleaning work is performed until the laboratory has performed all analyses and tests and cleared the castings.

A worker stamps each casting with data from the metal tag. Gates and risers then are cut off the castings and chipping and grinding work performed. Castings are loaded on a car and moved into a 10 x 14-ft blast cleaning room. A worker in the room directs the hose from which aluminum oxide grit is blown. Castings are subjected to critical visual inspection, and most of them are x-rayed.

As part of the foundry's quality control program, pertinent data are recorded for each type of casting produced. The information listed includes the type of sand mold and cores used, the alloy and its pouring temperature, the location of chills, and any other data pertinent to the job. In addition, a photograph of the casting with gating system attached is included.

The data card and photograph for each job are placed in a 4 x 6-in. envelope and filed by pattern number and name of part. Reference is made to the file each time the part is re-ordered.

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Gypsum or exothermic material sleeves are used in risers to aid proper feeding. Exothermics also are used to top risers. Two cans of the material are shown

Mineralogy of MOLDING SAND

This first installment in a series of six on sand topics covers occurrence of sand, fundamental properties, grain geometry, and processing features. Next month, sand types will be discussed

By W. P. WINTER
Assistant Professor
Pennsylvania State University
and
Sand Consultant, Royer Foundry & Machine Co.

● SAND is taken so much for granted by most people that its mineral constitution and formation seldom are considered. Today, however, with newer mineral substances being processed into useful sands that differ from the common variety, it is increasingly important to qualify the word "sand" as silica sand, zircon sand, olivine sand, and others and to compare them fully.

The *American College Dictionary* defines sand as "the more or less fine debris of rocks, consisting of small loose grains, often of quartz." The *Encyclopedia Americana* calls it "a mass of unconsolidated mineral grains of practically uniform size, large enough to be detected with the unaided eye, but too small for the grains to be readily picked up by hand."

In these definitions, the only reference to specific mineral constitution is the words "often of quartz." In both definitions, the major emphasis is on loose grains of rather small size.

Quartz is one of the common minerals—chemically, silicon dioxide. There are numerous varieties, which differ in color, luster, purity, etc. Thus sand, as commonly thought of, may consist of pure silica or may be a complex mixture of many minerals.

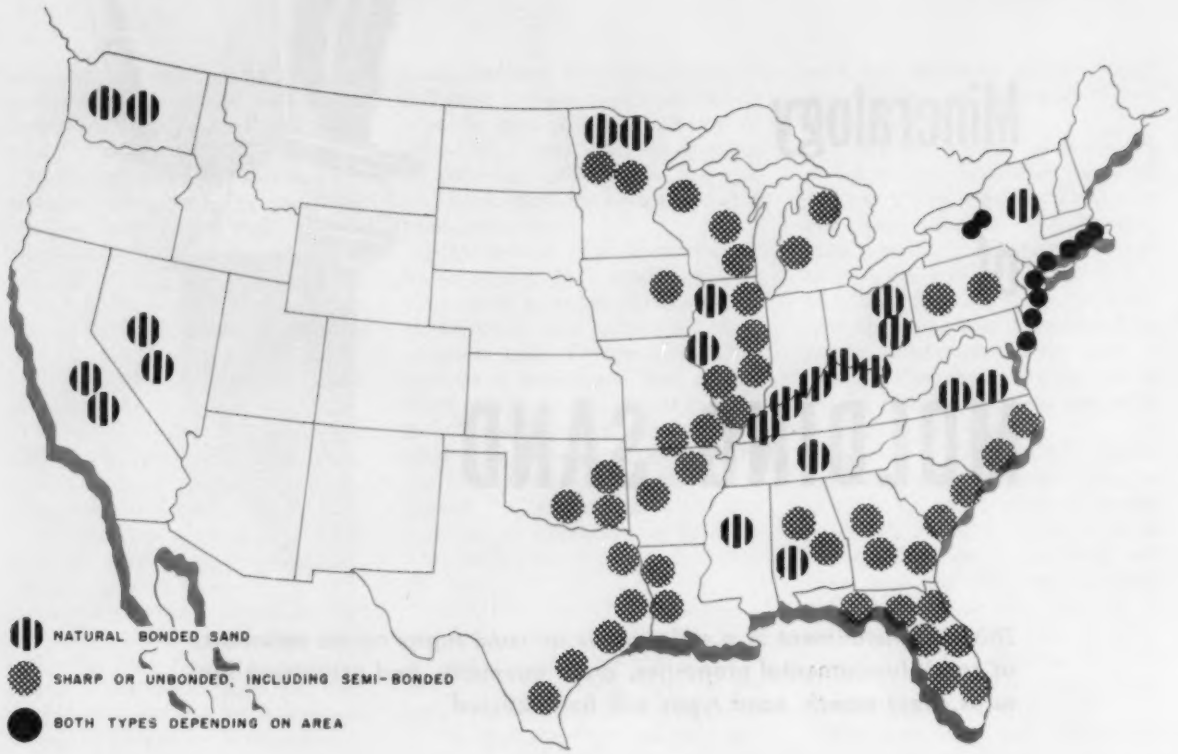
Occurrence — Sand suitable for foundry applications is found extensively in many deposits throughout the world. Silicon is one of the most abundant elements in nature, and it is to be expected that its compounds, including silicon dioxide (or sand), also would be abundant.

Many natural forces combine to reduce rocks to sand. The movement of glaciers probably started the process in the ice ages. Wind, waves, heat, frost, and other general weathering forces are at work constantly to transform rocks into a multitude of small particles.

The same forces that create sand also may have a part in its distribution. Particles often are carried by flowing water or blown inland by strong winds and deposited in beds of widely differing depths and locations.

The most recently formed sands naturally are on top, and older deposits become buried, often to considerable depths. Flowing water provides a natural classifying action, and the nature, direction, and speed of the currents carry the particles greater or lesser distances. It therefore is common practice to grade sands as obtained from different locations and depths in the same general deposit.

Geographical Deposits — In the United States, as all over the world, silica sand occurs commonly. Almost every state can claim some valuable sand deposits. For example, an extensive deposit of pure silica sand, closely related to the important Saint Croix and Saint Peter sandstone belt, extends from Northern Minnesota through Wisconsin, Michigan, and Illinois and into Missouri, Oklahoma, and



Map shows approximate locations of some of the more important deposits of naturally bonded and unbonded and semibonded sands in the United States

Arkansas. Map above shows deposits.

The extreme ends of this huge bed yield sands in the range of 60 to 70 grain fineness, and the central portion yields sands closer to 40 grain fineness. It is generally low in clay, and common dry mining methods produce a useful sand for all types of foundry applications and other uses.

Practically all of these same states also contain natural-bonded sand deposits that fill special foundry needs. In Illinois, for instance, the northern and western sections produce a fine grained, medium-bonded molding sand. Bank sands in Wisconsin, much like similar sands in Michigan, are medium to low in clay and are useful in a wide variety of semi-synthetic sand applications.

Almost any type and grade of sand for foundry applications can be found in the extensive and variable deposits along the eastern seaboard. This area includes Massachusetts, Rhode Island, Connecticut, New York, New Jersey and on down, along the southeastern states. Sands referred to by well known names come from restricted areas within this larger deposit. In the deposit as a whole, sands ranging from fine to very coarse occur, with all degrees of clay content and various degrees of purity. Heavy molding and loam work would be likely to depend more on the natural-bonded, gravel-bearing sands of New Jersey, properties of which include high density and low expansion.

Much of the sand from Pennsylvania is pure silica obtained by crushing amorphous rock. Some limitations are imposed by crushing, but high refractoriness usually is assured.

A reasonably high percentage of zircon is found in much of the sand processed from deposits along the coastal areas of the Carolinas and Florida. This fact alone often may change the total aspect of the sand and improve properties for some applications.

Southern and south central deposits include the angular grains of white, high silica sands of the gulf coast of Florida and Texas. These, along with the coarse river sands of Alabama and Georgia, are essentially free of clay substance.

Ohio is a major producing area for valuable natural-bonded molding sand. Such deposits are especially abundant in the eastern half of the state. These sands are well bonded. The sands of Ohio also are important in the glass industry because of their high purity.

More industrially important sand deposits are found on the West Coast. The deposits generally are smaller than those in most eastern areas, but they do contain both natural and sharp sands. They are somewhat low in purity, but useful in many applications for light cast iron and nonferrous work. Larger operations in the West generally rely on shipments of sand from Midwest processing plants.

Large deposits of magnesium ortho-silicate available in the Northwest are processed for use as olivine sand. Improved thermal properties can be shown to exist in molds made partially or wholly from olivine.

Fundamental Properties—Sand is not best judged by common chem-

ical analysis such as might be used to evaluate some other materials. The constituent elements as revealed by chemical study seldom tell much of a true mineralogical nature. Chemically, silica sand is designated as SiO_2, and other sands have their own chemical makeup; but the real story is best found in numerous physical properties. The color of sands may vary from pure white to a deep reddish brown, depending on the extent of essentially harmless chemical impurities.

Cleavage planes, brittleness, toughness, and hardness are of greater importance. The better sands are those which excel in a greater number of such physical properties than do others. Standard evaluations based on grain size and shape, refractory qualities, relative surface area, and other physical properties relate a given sand to its usefulness as a molding material for foundry applications.

The most serious effect of metallic oxides, which constitute the major chemical impurities in sand, is to lower the melting point. Essentially, such impurities reduce the refractory quality. Molecular weight, density, and solubility change very little, but the melting point may vary from a high of approximately 3200° F to a low of less than 2730° F. It is because of this factor that steel foundrymen often are concerned with the purity of a sand.

Grain Geometry—As mentioned previously, sand is essentially any mineral substance in a granular state. Reference has been made to the importance of the size of the grains. Some discussions of sand from given geographical locations include the terms "rounded" or "angular" grains. These two physical factors, the size and shape of the sand grains, are of considerable importance since many molding properties depend on them.

Try to imagine a particle small enough in diameter that 270 of them placed end to end would measure 1 in. This size limit represents the smallest sand grains. Anything smaller is called fines or silt. The upper limit is represented by a particle of such a size that six of them placed end to end would measure 1 in. The standards include nine additional sizes falling between these two limits.

If one of the smallest grains were to be enlarged one hundred times, it would be approximately ¼ in., about the size of a pea, and one of the largest grains would look much like a volley ball. Another of the larger grains would be about the size of a croquet ball. An ordinary marble could represent a grain third from the smallest, and a grain of a size near the middle of the system would be about the size of a golf ball. Common buckshot would be classed as fines.

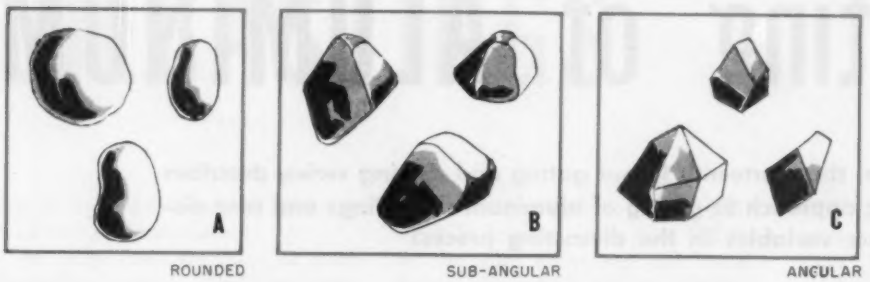
Grain size is important since the orientation of particles varies with size as well as with size mixtures. This orientation involves distribution of sand grains and will be discussed later in this series of articles.

Grain shape also is important. "Rounded" sand grains are roughly spherical. At the other extreme is the "angular" sand grain, which might be likened to a cube or to a partially collapsed sphere. The degree of angularity leads directly to a grain shape known by foundrymen as "subangular" grains.

During the early formative stages, the weathering of mineral substance tends to produce particles with sharp edges—that is, angular sand. Continued abrading action of wind and water causes a degree of rounding to subangular and rounded. This abrading also may take place during normal use over long periods of time. As it does, the sand loses its molding properties.

Processing Features—Since sand was most extensively deposited in beds on or near the surface during its formation, open-pit mining is the most common processing method. Much open-pit processing results in sand that is naturally bonded because no concerted effort has been or needs to be made to remove the clay content. The amount and type of clay present are important, but control tests provide this information. The clay variable thus can be taken into consideration and corrected if necessary.

In other types of processing, dredging (scooping sand from the bottom of lake or river), water pumping (pumping water and sand into settling basins), and crushing (reducing selected rock masses to grains by mechanical action) are used to process sand. These methods produce clay-free or "sharp" sands best used for those foundry operations requiring the addition of selected amounts and types of binders. Core work, steel casting production, and increasing amounts of gray iron casting production make use of these sharp sands.



All sand grains fit into one of these three shapes: A—Rounded. B—Subangular or irregular with rounded corners. C—Angular, irregular with sharp corners

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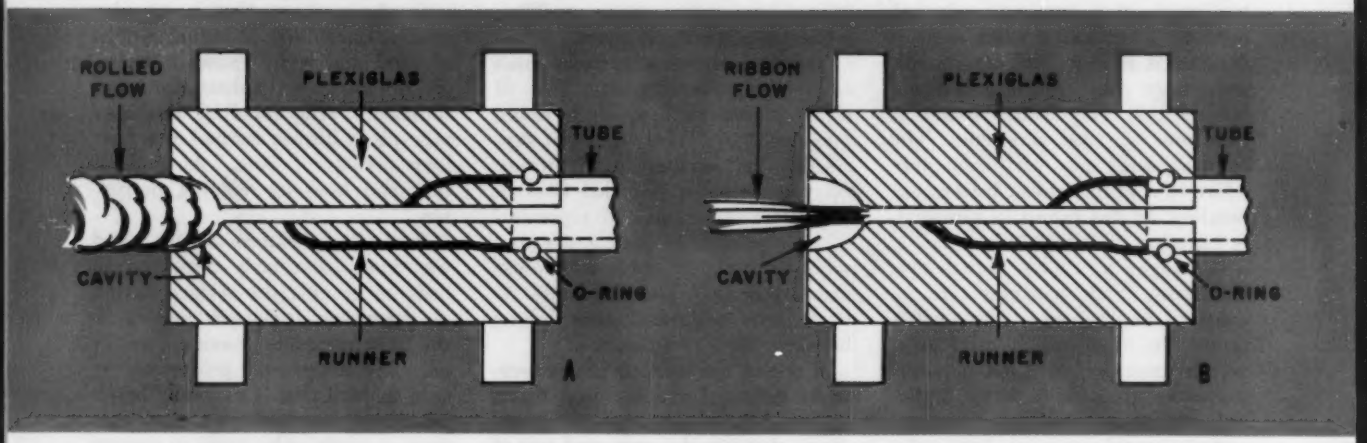

Fig. 1—Left to right, *A* shows steep ramp which causes turbulence in metal; in *B*, gentle ramp and long land deliver the metal in a tight stream, without turbulence; short land in *C* widens flow pattern; *D* is a side view of the die

Gating of ALUMINUM

This article, the fourteenth in our gating and risering series, describes a scientific approach to gating of aluminum diecastings and also discusses other variables in the diecasting process

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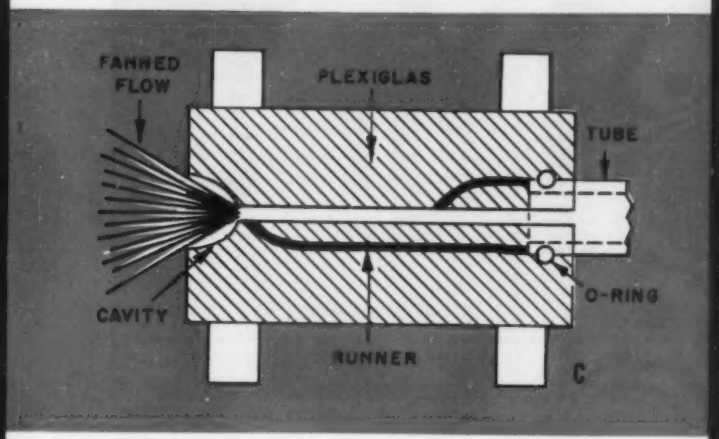
● GATING AND VENTING of a diecasting die must be considered from many aspects. It is true that the runners and gates serve as conduit and throttle for the metal from source to cavity. In this respect they are similar to other forms of casting runners. In diecasting, however, all the other forces and actions are different as to quantity, quality, and time.

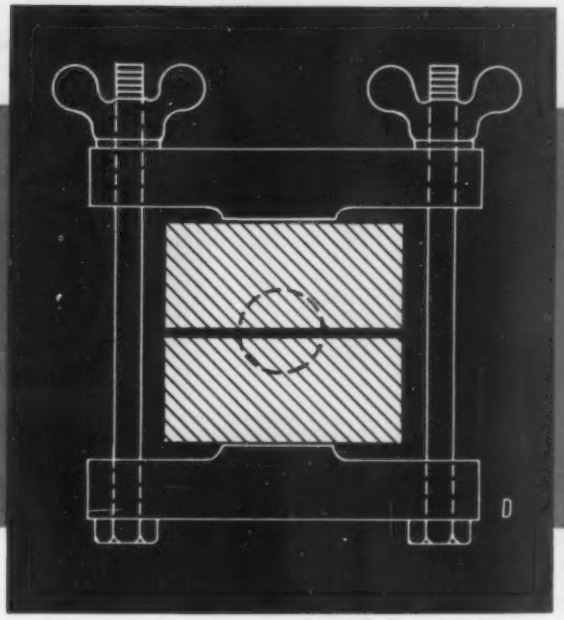
It is well, therefore, for the engineer to disregard completely any consideration of other casting methods when designing runners and gates for diecasting dies. Why is the design of runners and gates in diecasting dies different from, for example, the design of runners and gates in permanent mold dies? In diecasting, the molten metal, so long as it is fluid, always must be considered a hydraulic medium. Therefore the runners become a high-pressure, hydraulic conduit, and the gates become orifices in a high-pressure hydraulic circuit.

Consequently, runners must be designed not only as metal conduits, but also as hydraulic conduits—and they must be designed for the best hydraulic flow possible.

Gates also must be designed not only as metal restrictors or separators between runner and cavity, but as hydraulic orifices. These orifices act as the resistance to the entire hydraulic system of the machine. They are governors or resistances in the hydraulic circuit and as such have all the characteristics of pressure orifices as to flow, temperature changes, flow interferences, and resistance.

In diecasting, all the forces of metal injection are applied and resolved within a period of time so short that human senses cannot evaluate it. Consequently it is regrettable that diecasting long has been considered an art. Gating of a diecasting die has been accomplished by methods closely associated with witchcraft or black magic. The gate has been considered the prime cause of all casting failures and often has been changed and re-





DIECASTINGS

cut without any study as to what was being accomplished.

Actually, there are rules for good diecasting gating. The gate area, the vent area, and the runner layout all can be established before any metal is cut. If these rules are carefully followed, many hours of changing can be saved, and die run-in and tryout can be reduced to a minimum.

Table I shows time and pressure and their relation to different gate conformations. A study of this chart shows clearly that the time factor in diecasting is well below that at which the human senses are effective.

We know that with aluminum, to produce a good casting, gate velocity must be over 100 fps. We also know that a velocity of over 175 fps starts to build up high heat values, which become excessive in terms of resistance of die steels in the gate area.

An easy flowing alloy such as 380 will fill well at 100 to 120 fps velocity, but many of the alloys requested today, such as 218 or 6063, must be injected at as near 175 fps as the gate resistance will stand. Again, alloys with a long solidification range can be injected at close to 100 fps, whereas those with short solidification ranges must be injected at higher velocities.

Die temperature plays an important part in this filling time. If the die is operated cold, below 250° F, the fill time must be shortened. If the die is operated in the 500° F range, fill time may be lengthened.

Gate Temperature—It is a common fallacy, practiced by many, that the proper method to avoid solder and erosion at a gate is to lower the gate temperature. If the engineer will refer again to orifice flow characteristics, he will note that a cold orifice presents greater resistance to flow, and greater resistance creates more heat and erosion. In addition, friction alone can cause soldering of aluminum to steel.

Erosion of the gate often can be eliminated by operating the gate at 450° to 550° F. This temperature causes much less resistance at the gate. It avoids excessive heat rise at the gate and reduces gate friction, thereby reducing erosion and soldering. Many times the die steel is charged with being the offender, whereas actually a condition of excessive heat and friction has been created that is far in excess of the capacities of the steel or the heat treatment given the steel. This condition can be avoided easily.

Plunger Action — The velocity through the gate is caused, of course, by the plunger velocity. Plunger velocity should be treated, however, as a function necessary to accomplish this gate velocity, not as the one controlling factor. Rather, plunger action should be considered —that is, does the plunger move forward with no pauses or bounces and no period when a static pressure condition occurs.

To determine plunger action accurately, it is necessary to instrument it. This job can be done by high-speed photography or by the

TABLE I—Observed Freezing Periods and Pressure Loss

(Casting Weight, 8 oz—Volume, 8 Cu in.—Shot Weight, 12 oz*)

Gate thickness Inches (Width—1 in.)	Gate Length (Inches)	Gate Freezing Time (Seconds)	Runner to Casting Pressure Loss (Per cent)	Average Plunger (Velocity)	Cavity** Fill Time (Seconds)	Temperature Rise of Runner to Gate (Degrees F.)
0.030	0.0625	0.008	72	70 fpm	0.92	610
	0.125	0.011	65	70 fpm	0.84	580
0.040	0.0625	0.014	67	70 fpm	0.86	590
0.040	0.125	0.017	63	70 fpm	0.79	540
0.050	0.125	0.020	60	70 fpm	0.76	530
0.050	0.1875	0.028	56	76 fpm	0.71	506
0.060	0.1875	0.038	54	88 fpm	0.69	460
0.060	0.25	0.045	50	88 fpm	0.61	350
0.080	0.2187	0.060	50	88 fpm	0.62	290
0.080	0.25	0.085	46	88 fpm	0.59	210
0.100	0.25	0.110	44	88 fpm	0.58	100
0.100	0.2812	0.125	38	90 fpm	0.54	100
0.150	0.25	0.236	36	92 fpm	Gate no longer a factor	No longer occurred
0.150	0.3125	0.268	31	92 fpm		
0.200	0.25	0.428	26	92 fpm	Gate no longer a factor	No longer occurred
0.200	0.375	0.520	22	110 fpm		
0.400	0.25	1.70	16	N		
0.400	0.375	1.95	14	0		

*Approximately 250 shots were made with each gate conformation after uniform die temperature had been reached. Metal temperature and hydraulic pressure were kept constant. Tabulation is of the average. Approximately 25,000 castings were produced to prepare the data in this tabulation.
**Complete time from start of metal movement to final freeze off.

use of an oscillograph. However, an examination of the hydraulic circuit also may offer a fairly clear picture. Is the speed control valve on the rod end of the plunger where it belongs? Are there valves to shift on the plunger forward stroke? Is there a point in the forward motion at which no continuing pressure is applied? Is the hydraulic accumulator properly charged—is the gas-to-oil ratio correct?

The speed control valve *must* be on the rod end of the hydraulic cylinder. This location provides a constant, pressured resistance to the plunger and does much to eliminate plunger bounce, which will cause porosity in the casting without any other assistance. Plunger bounce causes erratic gate velocities.

The shifting of valves in the forward movement of the plunger can cause nothing but variables in the casting. No valve—and here the hydraulic people are challenged—can shift in the time period within which a diecasting must be made. If by guess we can set a valve so that it does shift within the fill period, this shifting cannot be held within casting times. The variable of shifting is influenced by electric current, oil temperature, oil viscosity, and oil type and condition. It cannot help but be a variable, and a big one.

Many diecast machines are made using a two-stage injection pressure. This construction may cause a variable, but this variable can be reduced to a minimum if constant pressure is exerted on the plunger and the booster pressure is introduced without occurrence of a static pressure condition.

Hydraulic Accumulator — The condition of the hydraulic accumulator probably has caused more rejected castings and more gate and runner butchering than any other mechanical factor. A hydraulic accumulator operates on the principle of hydraulic fluid stored under a gas cushion under pressure. The pressure valve is of little concern; the real factor is the ratio of gas to fluid. Table II shows the results of different volumes of fluid to gas. Again, the pressure is not the controlling factor; the ratio of gas to fluid determines the plunger action.

Gate Velocity—The formula for determining gate velocity is elementary and can be secured from many reference handbooks. This one has been used for many years and on many dies and is successful as well as simple:

$$\frac{W}{(O)(T)(L)(12)} =$$

velocity in feet per second where W is casting volume (cubic inches), 0 is time of cavity fill (seconds), T is gate thickness (inches), and L is gate width (inches).

The runner and gate must be designed using known factors. We know the casting weight and that our fill time must fall within certain limits—namely, a casting with average wall thickness of 0.100 in. must be filled completely in 0.100 seconds. The fill time requirement can be determined easily by study of the freezing time rate of different casting wall thicknesses. The average predominating wall thickness must be used.

Freezing time is influenced by the alloy. We have found that there is a 20 per cent decrease in time when alloys with a short solidification range are cast.

Casting Wall Thickness (inches)	Freezing Time (seconds)
0.030	0.008
0.040	0.017
0.050	0.028
0.060	0.039
0.070	0.048
0.080	0.064
0.100	0.100
0.150	0.236
0.200	0.410
0.400	1.700

Using these freezing times and the casting volume we have value W and O of the formula. The values for T and L must be determined by the shape and type of casting.

Gate Thickness—One factor must be remembered in using the freeze-off times: Gating thickness must remain in balance with average thickness of the casting. If a thin gate—0.030 in., for example — is used to fill a casting, with a thick wall—such as 0.150 in.—the freeze-off time in the gate will be far shorter than the freeze-off in the casting. This condition will cause

shrinks in the casting and may cause internal porosity.

An ideal balance would be an average casting wall of 0.080 in. and a gate thickness of 0.060 in. It must be remembered that pressure on the gate will tend to keep the metal moving longer than the metal in a static location in the die and will tend to feed the thicker area of the casting. In addition, the temperature in the gate area may be increased, extending the freeze-off time in that area.

It is perfectly possible, as well as good practice, to use a shaped gate —that is, one with a thicker area in one portion. This thicker area is used to channel metal to a thick location in the casting, providing feed to that area and avoiding shrinks and porosity.

The casting must be studied and the gate so situated as to feed the thicker portion of the casting. If it is impossible to locate the gate on the thick side, ribs or thick areas must be provided in the casting to carry the metal from the gate to the thick area and to feed this area during freeze-off.

All parts of the gate and runner must be smooth and free of any projections into the flow path of the metal. The surface need not have a high polish or buff, however; a smooth, uniform finish will reduce friction and prevent soldering.

Gate Conformation — Conformation of the gate also is important. Table I shows that the longer the gate land, the longer the freezing time, but the greater the pressure loss and the lower the temperature rise.

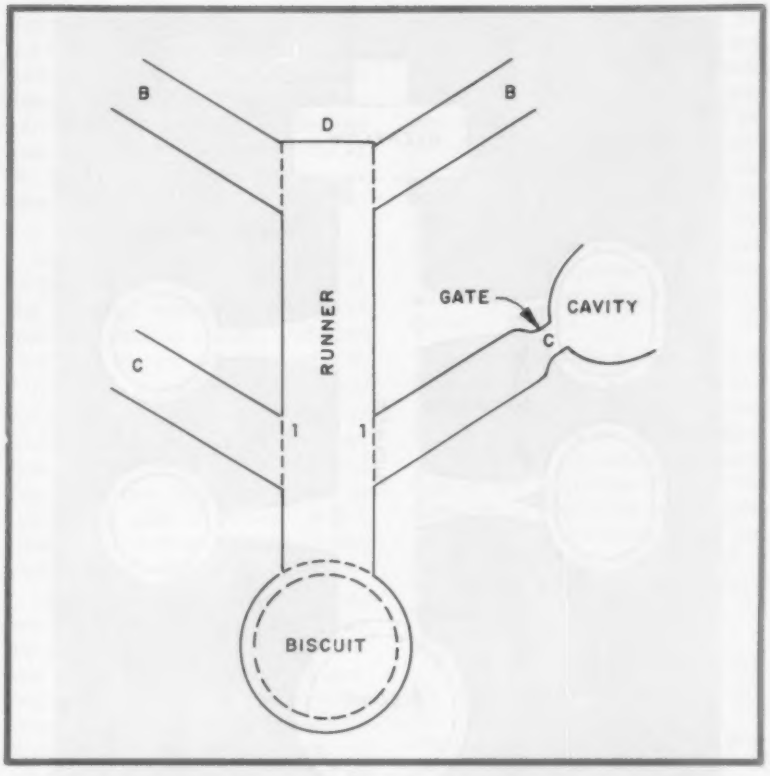


Fig. 2—Although commonly used, this runner system produces surface defects on castings. Metal, including cold metal and dross, branches off and enters side runners at low pressure before central runner is filled

In one project, many gate conformations were cut in plexiglas. This procedure is easy to follow and is recommended to any die designer (Fig. 1). Oil of about SAE viscosity number 40 is flowed through these plexiglas gates, and the flow is studied. From a study of this flow, it is easy to see the effect of long ramps and steep ramps and even to study the effect of an obstruction in the runner.

A steep ramp, Fig. 1A, will cause counterflow and will deliver the metal to the casting with a high degree of turbulence. A gentle ramp, Fig. 1B, tends to squeeze the metal into the gate and avoids counterflow. A gentle rise in the ramp with a long land will deliver

TABLE II—Hydraulic Accumulators*

(Machine Operating Pressure, 1000 psi)

Nitrogen Charge Gal.	%	Hydraulic Fluid Remaining End of Shot Gal.	%	Calculated Hydraulic Pressure on Piston End of Shot (psi)	Calculated Pressure on Metal (psi)	Actual Pressure Hydraulic Piston 1/10 Sec. (psi)	Actual Pressure on Metal at Gate 1/10 Sec. (psi)	Actual Pressure on Metal in Cavity 0.030 Gate (psi)	Actual Pressure on Metal in Cavity 0.050 Gate (psi)
20	80	2½	10	888	6970	870	6860	2060	2880
17½	70	5	20	875	6870	860	6725	2020	2820
15	60	7½	30	860	6750	850	6625	1990	2780
12½	50	10	40	833	6540	830	6400	1920	2680
10	40	12½	50	800	6340	790	6150	1840	2570
5	20	17½	70	666	5230	660	5125	1540	2150
2½	10	20	80	500	3925	500	3900	1170	1630

*Accumulator, 25-gal. capacity; hydraulic piston, 7 in. in diam; plunger tip, 2½ in. in diam.
The actual pressures are observed pressures. Due to other operating conditions, however, an average is necessary. From 50 to 100 shots were made with each accumulator proportion charge. All other factors remained the same. This series included a total of 2100 shots.

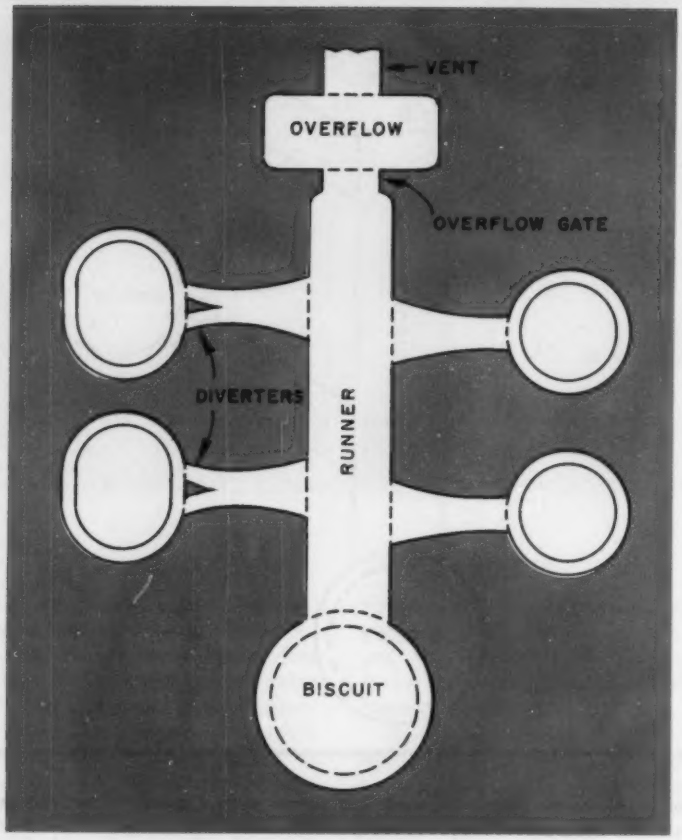


Fig. 3—With this runner pattern, metal fills the entire central runner, taking dross and cold metal to the overflow and venting gas before good metal branches off to the side runners and cavities with equal pressure

the metal in a tight stream without turbulence and with a minimum of heat rise. Remember that the gate is an orifice and must be treated as such. The shorter the land, the wider the flow pattern (Fig. 1C). Study hydraulic flow through orifices; it is well defined in many textbooks.

Many techniques can be used on gates. They can be fed under the casting, or the casting may be edge-fed. The end use of the casting and the secondary operation determine which, but the proper design of the gate never should be sacrificed to the secondary operation. The scrap cost is too high.

The thinnest cross section of the gate can be brought back from the edge of the casting. This procedure avoids a crystallized area on the casting edge and brings the break-out defects back from the casting edge.

Because of the high heat developed at the gate in many castings, the metal at the gate may, when it solidifies, be highly crystallized. All solidified crystals, when examined, appear to lie flat in the flow direction. When the smaller area of the gate is directly adjacent to the casting, these crystals cause a break-out when the gate is broken from the casting.

There are two methods to solve this problem: You can move the thin area away from the casting edge, or you can shear or cut rather than break the gate from the casting.

Runner Pattern — The runner pattern on the parting line of the die must be considered a high-pressure conduit and be so treated at all times. It must be free of all obstructions, with no place in the runner where the area is expanded. Rather the area may be left either constant or reduced. Expansion causes gassing or frothing and also introduces rapid temperature changes.

Walls of the runner must be smooth, without rough surfaces which will retard flow or cause turbulence. Metal must be conveyed from the metal chamber to the cavity with as little turbulence and as little change in temperature as possible.

Fig. 2 illustrates a runner pattern which often is used although it produces surface defects on the casting. As the metal is injected, the upper edges (1-1) tend to catch a partial flow of metal and direct some into the cavities (C-C). This action injects a light flow of metal, not under full pressure, into the cavity. The metal freezes and forms a cold metal area in the casting. This area is rough or porous because it is unable to weld to the metal that flows in last. Such cavities show low pressure when cavities B-B are filled and complete. In addition, the abrupt end of the runner D causes the metal to set up reverse action and rolls cold metal into B-B.

Fig. 3 shows a good runner pattern. The metal first hits the area of the overflow gate, where gas, oxide, and cold metal are deposited in the overflow, and the entire runner is filled. Metal then is expanded sidewise out of the main runner to both sides with equal force and in a continuous flow.

In Fig. 3, two objectives have been attained: 1. Cold metal, oxides, and release residue have been forced into the overflow. 2. Clean metal from within the runner stream has been forced into the cavities with equal force and at equal time. Instruments will show simultaneous filling of all cavities with equal pressure. With this type of runner, never reduce the runner area from biscuit to overflow gate.

Runner Cross Section—Cross section of the runner is important. Many patterns are used, mostly by accident, but the ideal pattern is one which ejects easily and has the least die area exposed to metal. A round cross section is not practical, although it presents the least die area to injected metal area ratio. Fig. 4 shows an ideal compromise. This runner is easy to cut, requires no matching to the cover half, and

if cut to the proper ratio of depth to width gives minimum exposure of injected metal to die.

Study of hydraulic flow indicates why the runner area shown in Fig. 3 causes the metal to flow outward from the runner into the cavity with the least turbulence and the least forming of chilled metal. The flow becomes almost a burst from the main runner into all the branches.

Overflows—All except the most simple castings must have overflows, which can serve many purposes. However, all these purposes must be evaluated as to their effect on the casting before the overflows are used.

The main function of overflows is to carry first metal past a casting edge and leave on the edge only hot metal capable of making smooth, intimate contact with the die surface.

The first metal entering a die cavity carries with it a high concentration of oxides, release residue, and injection turbulence froth. It also carries with it foiled metal—that is, thin skins of metal formed by contact with die surfaces. If this foiled metal is permitted to deposit itself in any one area of the cavity, it forms patterns which closely resemble packed foil. These deposits cause poor finish and porosity. It is desirable and usually necessary to carry this "first" metal through the cavity and into an overflow.

The overflows are connected to the casting by overflow gates, and the location and conformation of these gates are important. The gates usually range in thickness from 0.020 to 0.030 inch. The thickness is determined by the speed with which it is desired to bleed off first metal. Width of the overflow gate must be enough to give the area of all overflow gates a total of 60 to 75 per cent of the runner gate. This width permits exit of first metal, gas, and air.

In the event that all overflows are located in the area of first fill of the cavity, additional overflows must be used to provide sufficient vent area to vent the die properly.

It usually is good practice to place ejector pins in the overflow area to facilitate clean ejection of the overflow. The overflow also should have generous draft, especially on the casting side, to prevent shrink toward the greater volume of the casting from sticking the overflow.

Overflows often can be used for other purposes, as well. They may be used to eject the casting without ejector pins in the finished casting itself. This practice requires an overflow gate sufficiently strong to eject the casting without distortion. Overflows also often are formed so as to serve as hooks or attachments for carrying the casting on conveyor systems. Another use is for location in secondary operations. Here a definite word of caution is in order.

It is poor practice to connect the overflows outside of the casting. This practice leads to backfill from the overflows into the casting area. As long as it is fluid, metal will, of course, follow the line of least resistance. When overflows are connected, the metal often will flow from one area of the casting through one overflow, into another overflow, and back into another area of the casting. This backfilling causes two metal fronts to meet and try to weld within the casting area. It creates rough casting surfaces and internal porosity. If overflows must be connected, place chokes in the connecting runner. It must be remembered that overflows are not flash. They are a definite part of the diecasting system. Use them according to the rules, not on the basis of "art."

Cavity Vents—It is impossible to fill a cavity with any material while any other material occupies the cavity. This law of materials is basic and cannot be circumvented. Therefore a very important part of the diecasting system is the cavity vents. The vents in a diecasting cavity can be designed in accordance with a predetermined plan. If carefully applied, they need never be changed.

The basic rules for venting a casting are simple. With a hot, dry die and an entry velocity of 150 fps, the vent must have a total area one-half the area of the gate. If the entry velocity is reduced, the vent area may be reduced, but it need not be. Location of the vents must be such that the first metal to enter the cavity cannot close them off. Here again it is necessary to study the flow pattern of the metal into the cavity. Locate overflows away from points of first contact and, in most instances, take the vents off the overflows. There are, however, three exceptions to this general rule.

First, the character of the casting may be such that it is desired to direct first metal through the cavity

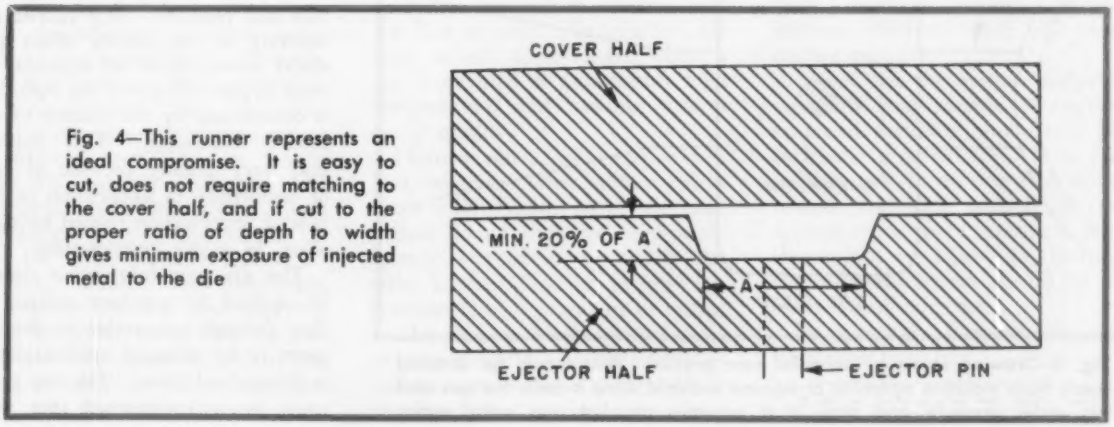


Fig. 4—This runner represents an ideal compromise. It is easy to cut, does not require matching to the cover half, and if cut to the proper ratio of depth to width gives minimum exposure of injected metal to the die

to an overflow to remove foiled metal or stained metal from the casting. In this instance, locate the first overflow at the point of impingement of first metal and take the metal off. The vent from this overflow may be small or may be eliminated if it is desired to bleed off into the overflow under resistance.

Second, it may be desirable to introduce more heat into a certain cavity area. An overflow will do this job, and it need not be vented or can be vented under restriction.

Third, it sometimes is necessary to place an overflow in an area of the die surrounded on all sides by the casting, such as a ring or circular housing. In this event, the overflow can have no vent unless it is through an ejector pin.

In any event, total vent area should be one-half the gate area. When there are long ribs or extensions on a casting, the overflow at the end should be generous to remove metal solidified during flow to this point, and the vent from this overflow must be large enough to allow the air and gas free access to the outside.

Vents must not be confused with flash. Vents are a functional part of the cavity and of the diecast process. Flash is the result of poor die design or poor clamp practice.

Vents never should be connected from one cavity to another, even when vacuum is used. Instrumentation and the use of trace materials has proved that this practice, even with vacuum applied, causes terrific back pressures and reverse flow of metal from one cavity to another. It also causes gas under pressure to flow into another cavity, where it is trapped by back pressure reaching a balance with injection pressure to the cavity. Because the air or gas has no place to go, it remains in the cavity and shows up as porosity in the casting.

The profile of the vents is important. Several are good, but the one shown in Fig. 5 probably is employed the most successfully. For operator comfort, it is good practice to try to direct the vent away from him or against a shield. Hot gas and air under pressure emit from the vent, and if the vent area becomes too hot it may spit metal vapor. The operator always must keep vents free of solidified material—that is, keep them operating as vents.

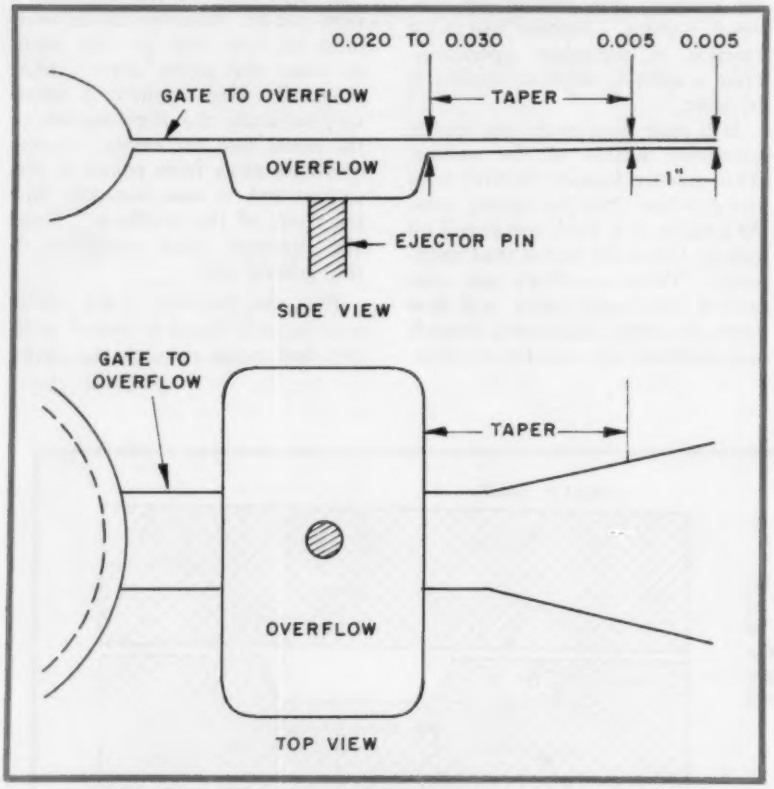


Fig. 5—Drawing shows a successful vent profile. Vent should be directed away from machine operator or against a shield since it emits hot gas and air under pressure and may, if it becomes too hot, spit metal vapor

Releases and Lubricants—Die releases and die lubricants should not be confused. They are different materials. A good die release cannot be a good lubricant for the working parts of the die.

A good die lubricant must prevent parts of the die, ejector pins, core slides, guide pins, and locks from galling and binding. It must do so in the close proximity of high temperature and counter to highly abrasive material. It must not dissipate under high temperature, and it must not leave the surface of the lubricated parts under any casting condition.

If a material is used on the die surface that is a good part lubricant, it will remain on the surface under metal injection and force inclusions in the casting. This condition causes scrap. If it vaporizes prior to the metal injection, the die operates without proper lubrication of the die parts. This situation causes stuck ejector pins, bound guide pins, and galled cores—and downtime is expensive.

A good die release material consists of a release material blended with a carrier or extender. The carrier must dissipate completely prior to any metal injection, leaving the release material deposited on the die surface in as uniform a pattern as possible.

Any carrier left in the cavity when the metal hits it only can cause gas or steam and back pressure, which results in unfilled cavities and porosity. Any carrier remaining in the cavity when the metal enters causes an explosion of some degree. Force of the explosion is determined by the volume of extender remaining. This volume may vary greatly because of lack of uniformity in application or the rate of vaporization caused by variation in cavity temperature.

The die part lubrication should be applied by separate means, either through connection to the die parts or by manual application at a determined time. The die parts must be so constructed that they

can be lubricated properly.

Die release material must be applied in a uniform manner, by a metered system, to achieve uniform casting quality. I have witnessed many instances of a die having been removed from the machine to weld and recut the gate and runner when the only fault was in the application of die release material. A gate that checks out with the formula never should be recut until all the facts concerning the application of the die release material have been reviewed and until a uniform, metered amount is applied each time. Do not depend on human judgment to achieve uniformity.

Application of this material offers a wonderful opportunity for the machine operator to show that he's an artist. He goes to work with a spray gun or, worse yet, an old sock or glove on the end of a copper tube. He twists up his face and hits the die with alternate blasts of air and release material—how much, no one knows. He never hits the die twice in the same place or with the same amount. His artistry produces either a masterpiece or a flop, and he never can repeat the performance exactly.

When his art does not produce a masterpiece each time, the gate or runner or both are changed. This change costs money, but, even worse, it gives the entire diecasting industry a bad name so far as consistent quality is concerned. It causes customers to set extremely high quality standards, and it hurts everyone.

Plunger Tip Lubrication—The method of lubrication of the plunger tip in the cold chamber must be controlled. The obsolete method of brush or paddle application—I use the word "obsolete" deliberately because any diecaster using this practice is obsolete in his methods—has to cause a high percentage of variable conditions. The operator cannot apply the same amount of material each time, he cannot keep his material consistent, and he cannot apply the material where it belongs—that is, between the tip and the cold chamber well.

Using plunger tip lubrication with tracer material and applying it by brush, we found that the material always came to rest in the areas of high porosity in the casting. On the same die, using the same material in a lubricator that applied material between the tip and the cold chamber wall, we found no tracer in the areas where it had been deposited previously, and we eliminated the porosity. This test now is a matter of record on more than 53 dies and on many more that have been reported on.

Many good materials for die part lubrication, die release application, and plunger tip lubrication are available. Good ones are manufactured (blended) under uniform conditions, and most of them are mixed under controlled conditions of heat. Some are even homogenized. All of these are preferable to and actually cheaper to use than those mixed by guess in a diecaster's own plant. No one can afford to use improperly compounded or nonuniform materials.

Die Temperature—To produce consistent casting quality, the temperature of a diecasting die must be consistent. Die temperature controls the vaporization of the extender in die release material and the flow of metal. In addition, die steel usually lasts longer when a die is operated at a uniformly high temperature, and castings are of better quality.

Heaters often are necessary in dies, especially when alloys with a short solidification range are cast. I have found that the most satisfactory method is to attach flat strip heaters directly to the impression block. Slots can be milled in the shoe or block to give these clearance, and a material which insulates both heat and electricity can be placed in the slot in the shoe. This practice assures that most of the heat will be retained in the impression block, where it belongs. Another method is to drill holes in the block and insert cartridge heaters. Fig. 6 illustrates the method of installing strip heaters.

When a hot die is run, it often is desirable to place a sheet of asbestos or refrax material between the die and the machine platen.

When the runners and gates are proper, you will have checked them as to layout, flow, and area, and you will have checked the vents. Still you may get a high percentage of scrap, even though you get many good castings. Do not start recutting gates and runners. First check the other factors of production for proper operation.

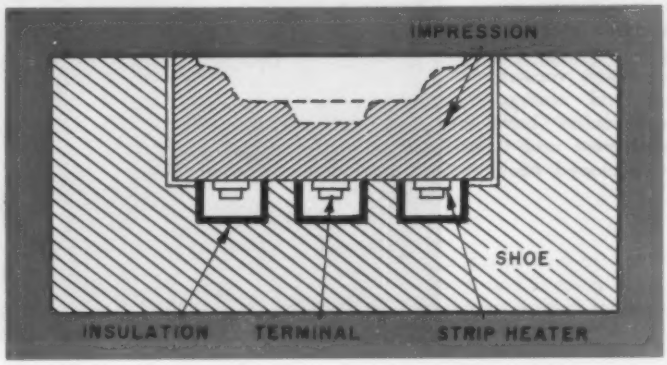


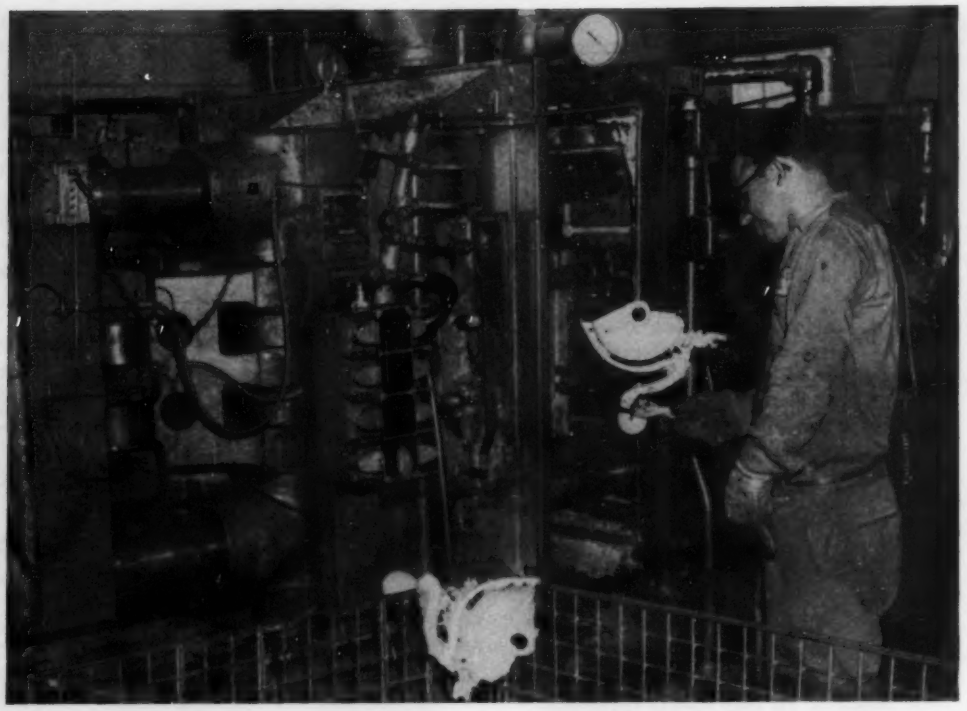
Fig. 6—Satisfactory method of heating dies employs flat strip heaters attached directly to the impression block, as shown in this drawing

For example, the hydraulic oil in the machine by itself can raise scrap from 2 per cent to over 20 per cent. This scrap is caused by the condition of the hydraulic oil. If the oil picks up a high gas content, the gas causes compressibility in the oil. This condition causes plunger bounce, which by itself will cause casting porosity.

Check the die release material, especially your method of application and metering, and check the hydraulic accumulator. It is reasonably safe to assume that if the runner and gate pattern is producing some good castings, they should not be changed. Instead, the collateral factors should be examined and corrected.

Be scientific: Remove the "art" from your operation.

● For an extra copy of this article, until supply is exhausted, use card on Page 55



Anodizable diecastings are produced on a 400-ton capacity machine equipped with vacuum feeding and casting. Process requires both this equipment and a newly developed alloy

Aluminum Diecastings Can Be

WELDED...BRAZED ...OR ANODIZED

The combination of a new alloy and vacuum diecasting has made possible production of aluminum diecastings which can be anodized, porcelain enameled, chrome plated, welded, or dip brazed

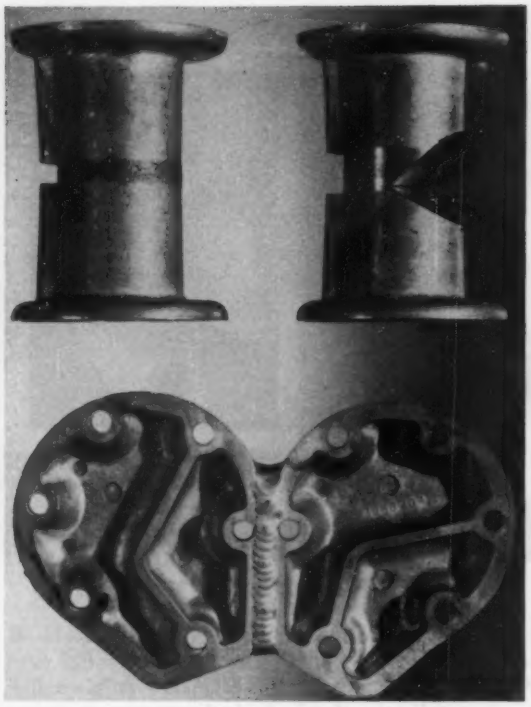
By JACK C. MISKE
Associate Editor

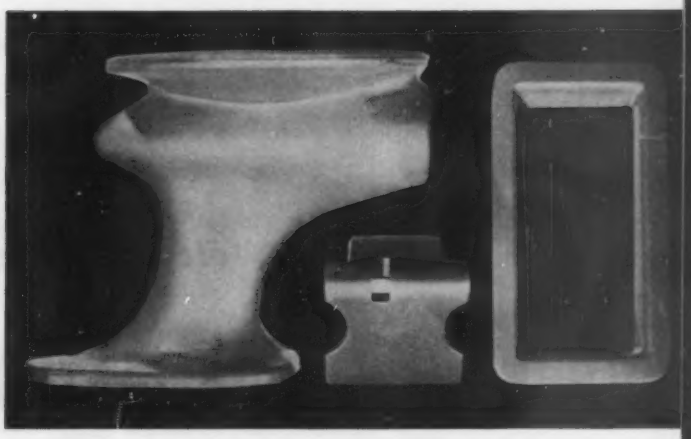
● THE COMBINATION of a new alloy and vacuum diecasting is enabling Hamilton Die Cast Inc., Hamilton, Ohio, to produce aluminum diecastings which can be anodized, porcelain enameled, chrome plated, welded, or dip brazed.

Physical properties include 37,000 psi tensile strength, 24,000 psi yield strength, and 5 to 7 per cent elongation. In addition, the castings machine freely, with an ease approaching that of zinc.

Silicon-Free Alloy—Both the special alloy and the vacuum process are essential to production of these diecastings. The alloy, which has been given the name Hamiloy, was developed in conjunction with a metal producer. It is free of silicon and contains some other elements in percentages variously higher or lower than those commonly used in diecasting alloys. Chrome plating and buffing are facilitated by the absence of silicon. The metal is cast at temperatures considerably above those of standard diecast alloys.

Vacuum Vital—Vacuum diecasting, which removes gases from the





Above—Left to right, matte natural color finish; buffed, high-gloss gold anodized finish; and directional scratch satin finish in pink gold

Left—Top, aluminum diecastings dip brazed by preheating at 950° F for 30 minutes and brazing in a flux at 1050° F. Bottom, diecastings welded by the tungsten arc inert gas shielded method

die cavity when the shot is made, is required because the castings must be free from gas porosity. Otherwise the gases would expand and cause blisters and severe dimensional changes in the castings during high-temperature processing such as welding, brazing, or porcelain enameling. Vacuum diecasting also produces a fine hardware finish and speeds up considerably the rate at which castings can be produced.

To make these castings, Hamilton uses a conventional 400-ton unit equipped with a vacuum process which hoods the platens of the machine. This type of vacuum equipment permits the use of any die, new or old, regardless of the presence of core pulls, stepped parting lines, or other unusual features. Automatic vacuum feed replaces ladling.

Although the machine as manufactured possessed the basic features required, Hamilton Die Cast made important alterations to adapt it to the production of Hamiloy diecastings. These changes include the distance molten aluminum has to travel to reach the die.

Melting — The special alloy is melted in a reverberatory-type furnace with the molten metal retention well directly under the shot sleeve. This arrangement permits the metal delivery tube to project from the shot sleeve to the bath, and metal is carried the shortest distance possible from the well to the die. The external and internal construction of the tube and of various attachments to it are critical and are vital to the operation.

Dies—As indicated earlier, production of these castings does not require a die made specially for the process. The same die can be used without a vacuum or for other alloys. Gating is no different from what it would be ordinarily, and conventional die steels are used. Thus one set of tooling for a casting permits a customer to use a variety of finishes or to weld or braze his part.

Heat Problems Overcome — Because the castings are remarkably free of gas porosity and the melting point is unusually high, welding or brazing can be used to assemble hollow parts which previously were not diecastable because of internal back drafts.

Welding is done with the tungsten arc inert gas shielded method, which, of course, is accompanied by high temperatures. Dip brazing is accomplished by preheating a casting for 30 minutes at 950° F, then brazing it in a flux at 1050° F.

The freedom from gas porosity and the high melting point also are the keys to successful porcelain enameling of these diecastings since the porcelain used bakes out at 1000° F.

Anodizing—Three types of anodized finishes can be produced, in various colors and in shades of each color. The matte finish is a nondirectional surface, automatically prepared. Its appearance varies from a dull tone to a semigloss.

Next is a satin or brushed, directional surface, obtainable either automatically or manually, depending on the shape of the part involved. This type provides the clearest, crispest colors.

Last is the bright finish, a high-gloss, buffed type, nondirectional in nature, also obtainable manually or automatically.

To perfect these finishes, a process which varies in some respects from standard anodizing is used, although the results are the same.

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Detroit Welcomes First

Diecasting Exposition and Congress

JOHN L. MacLAREN
General Chairman

America's diecasters will meet in Detroit Nov. 8-11 at the first National Diecasting Exposition & Congress to discuss the industry's technical progress and to see the latest in equipment and supplies

View of downtown Detroit skyline with Canada across the Detroit River

HARRY D. HALL
Program Chairman

DAVID C. SALATIN
Vice Program Chairman

ARTHUR M. CLARK
Exhibition Manager

● THIS MONTH, for the first time in history, America's diecasters will meet to discuss the industry's technical progress and to see the latest in diecasting equipment and supplies. Their meeting will take place Nov. 8-11 at the First National Die Casting Exposition and Congress, Detroit Artillery Armory, Detroit. Thousands of diecasting engineers, diecasting plant executives, buyers of diecastings, metalworking production executives, tool and manufacturing engineers, and design engineers and stylists are expected to be on hand.

The exposition and congress is sponsored by the Society of Die Casting Engineers and will offer visiting diecasters 80 exhibits and approximately 30 technical papers during the four days of the meeting.

Exhibits — Exhibitors (see Page 119) include producers of diecasting machines, dies, die steels, casting metals, production and finishing equipment, diecasting supplies, diecasting services, and diecastings themselves.

Technical Program—Papers will be presented at eight sessions, one each morning and afternoon of the four-day meeting (see Page 118). Offered by outstanding authorities in the field, they will cover such general areas as die design, die building, metallurgical developments, what lies ahead in the diecasting industry, competition to diecastings, cost and profit, quality control, and vacuum diecasting.

Each individual who registers to attend the technical sessions will receive a bound volume of all papers presented. In addition, copies of individual papers will be distributed at the close of each session.

Development of the program has been based on a survey of diecasters to determine what areas are of the greatest interest to them. Technical co-operation has been extended to the SDCE by the American Zinc Institute, the Magnesium Association, and the Aluminum Smelters Research Institute.

Facilities — To house visitors, rooms have been reserved in six leading Detroit hotels, with convention headquarters in the Sheraton-Cadillac Hotel. All exhibits and technical sessions will be held at the Detroit Artillery Armory.

Banquet—The exposition banquet will be held Thursday evening, Nov. 10, at the Veterans Memorial Building, in downtown Detroit. Joseph G. Rayniak, director and past president, Outboard Marine Corp., Waukegan, Ill., and Cecil M. Hunter, Oklahoma humorist, will be speakers, and Earle W. Rearwin, chief engineer, Reed-Prentice Div., Package Machinery Co., East Longmeadow, Mass., will be master of ceremonies. At the banquet, the SDCE will present the first of its Achievement Awards to an individual for outstanding achievement in the application and development of the diecasting process.

Foreign Delegations—As the first meeting of its kind, the Detroit Exposition and Congress has attracted worldwide attention. Foreign visitors will include a British delegation of diecasters who will attend under the auspices of the Zinc Alloy Die Casters' Association. From Japan, the Japan Die Casting Association will send a team of diecasting executives. Substantial representation also is expected from France, Germany, and Italy, as well as from the Middle East and Latin America.

Ladies Program — An extensive ladies activities program has been arranged for the wives of visitors to the exposition. Activities include sightseeing tours, luncheons, a fashion show, an historical tour, a plant tour, a shopping tour, and other attractions. Ladies may participate in the entire program, or any part of it, as they choose.

Committees—Congress chairman is John L. MacLaren, Aluminum Ltd. Sales Inc. The program has been arranged by Harry D. Hall and David C. Salatin, both of the General Motors Technical Center, General Motors Corp., who are program chairman and vice chairman respectively. Arthur M. Clark, Engine and Foundry Div., Ford Motor Co., is exhibition manager. Other committee chairmen include Stuart P. Hall, Hall Industrial Publicity, Inc., publicity; Arthur Linzell, Hydraulic Press Mfg. Co., registration; and Ralph C. West, Aluminum Co. of America, housing.

FIRST NATIONAL DIE CASTING

PROGRAM

TUESDAY, NOV. 8

9:30 a.m.-12 noon—Die Design

Mathematical Determination of Die Design, John Caster, Syracuse University Research Foundation.

Further Remarks on Gate Design in Aluminum Diecasting, John Lapin, Central Foundry Div., General Motors Corp.

A Case Study in Die Design for Aluminum and Magnesium Diecasting, speaker from McCulloch Corp., to be announced.

1:30 p.m.-4 p.m.—Die Building

Mold Fabrication—Cost Reduction and Control, Rolf H. Berg, Atols Tool & Mold Corp.

H-13 Steel as Used in the Diecasting Industry, Arthur E. Scholz, Crucible Steel Co. of America.

Temperature Related to Molds and Casting Properties, Ross Dean, Sterling Inc.

WEDNESDAY, NOV. 9

9:30 a.m.-12 noon—Metallurgical Developments

Studies on the Influence of Gas Content, Pressure, and Magnesium Content on the Mechanical Properties of Aluminum Diecastings, Dr. Werner Ruegg, Injecta Ltd.

Alloy Control for Zinc Diecastings, J. L. Kimberley and Ernest W. Horvick, American Zinc Institute.

Metal Handling and Control, F. William Foss, Apex Smelting Co.

Metallography of Diecastings, G. Leslie Armstrong, U. S. Reduction Co., and Robert Harder, Lukens Aluminum Co.

Plating and Anodizing of Aluminum Diecastings, Robert Harder, Lukens Aluminum Co.

1:30 p.m.-4 p.m.—What's Ahead in Diecastings

Aluminum in the Automobile Engine, P. R. Kalischer, editor, Precision Metal Molding.

The First Watercooled Diecast Six-Cylinder Engine Block, by A. F. Bauer, Doehler-Jarvis Div., National Lead Co.

Diecast Engine Design for the European Market, G. Triulzi, A. Triulzi S.A.S.

Vibracast Process and Ultrasonics as Applied to Diecasting, John E. Weber, Southern Die Casting & Engineering Co., and Earle W. Rearwin, Reed-Prentice Div., Package Machinery Co.

THURSDAY, NOV. 10

9:30 a.m.-12 noon—Competition to Diecasting

Modern Permanent Molding as a Process for the Foundry, Frank Ross, Permanent Mold Die Co.

Impact Extrusions Today, James M. Rich, Aluminum Co. of America.

Sand Casting Process, a Competitor of Diecasting, Thomas B. Pfaff, Pontiac Motor Div., General Motors Corp.

Dictaphone Experience in Designing and Engineering Components, Frederick W. Roberts, Dictaphone Corp.

Plastics—Competitor of Diecastings, William O. Bracken, Cellulose Products Dept., Hercules Powder Co.

1:30 p.m.-4 p.m.—Cost and Profit

Automation and "Make or Buy," Lee S. Garretson and Thomas E. Nadeau Sr., Ford Motor Co.

Short Runs, D. H. Naffziger, Delco-Remy Div., General Motors Corp.

Advances in Impregnation Materials and Techniques, George J. Caudron, American Metaseal of Detroit.

8 p.m.—Banquet. Speakers: Joseph G. Rayniak, Outboard Marine Corp., and Cecil M. Hunter, Oklahoma humorist.

FRIDAY, NOV. 11

9:30 a.m.-12 noon—Quality Control

How Castings Affect Quality of Electroplated Diecastings, William H. Safranek, Battelle Memorial Institute.

Effect on Product Quality of Cavity Design, Tool Installation and Machine Operation, Earle W. Rearwin, Reed-Prentice Div., Package Machinery Co.

Casting, Trimming, and Handling Techniques for Obtaining Quality Diecastings, A. Sugar, Cast-Master, HPM Div., Koehring Co.

Review of Methods To Obtain Improved Corrosion Resistance for Plated Zinc Diecastings, Donald R. Millage, Edward Romanowski, and Dr. Henry Brown, Udylite Research Corp.

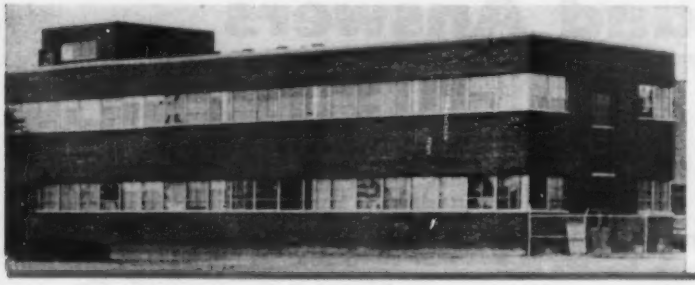
1:30 p.m.-4 p.m.—Vacuum in Die Casting

Vacuum Diecasting—A Resume of Progress to Date, Hiram K. Barton, Hiram Barton Associates.

Some Effects of Vacuum Casting on Surface Finish, E. L. Simpson, Bell & Howell Co.

Use of Vacuum in Production of Anodized Quality Aluminum Diecasting, Joseph A. Woltering, Hamilton Die Cast Inc.

EXPOSITION AND CONGRESS



EXHIBITORS

Advance Products Corp. ..... Benton Harbor, Mich.
Aldridge Industrial Oils Inc. ..... Cleveland
Alliance Mold Co. ..... Rochester, N. Y.
Alloys & Chemicals Corp. ..... Cleveland
Aluminum & Magnesium Inc. ..... Sandusky, Ohio
American Rotary Tool Co. ..... Great Neck, Long Island, N. Y.
Apex Smelting Co. ..... Chicago
Atols Tool & Mold Corp. ..... Chicago
Automation ..... Cleveland

Bendix Products Div., Bendix Corp. .... South Bend, Ind.
Buhler Mill Engineering Co. ..... Minneapolis

Cast-Master, HPM Div., Koehring Co. .... Bedford, Ohio
Clearing Div., U. S. Industries Inc. ..... Chicago
Celanese Corp. of America ..... New York
Cleveland Automatic Machine Co. ..... Cincinnati
Clifford-Rockwell Co. ..... Detroit
Columbia Tool Steel Co. ..... Detroit
Columbus Automatic Lubrication Co. ... Columbus, Ohio
Crucible Steel Co. of America ..... Pittsburgh

Detroit Mold Engineering Co. ..... Detroit
Dodge Steel Co. ..... Philadelphia
Dow Chemical Co. ..... Midland, Mich.

Electric Autolite Co. ..... Toledo, Ohio
Elox Corp. of Michigan ..... Troy, Mich.
Encyclopedia Britannica ..... Detroit

John Erler Industries Inc. ..... Toledo, Ohio

FOUNDRY ..... Cleveland
Foundry Div., Ford Motor Co. ..... Dearborn, Mich.
R. H. Freitag Mfg. Co. ..... Akron

General Motors Corp., Technical Center .. Warren, Mich.
Samuel Greenfield Co. ..... Buffalo
Greenlee Brothers & Co. ..... Rockford, Ill.

E. F. Houghton & Co. ..... Philadelphia

Industrial Mfg. Corp. ..... Indianapolis
Industrial Publishing Corp. ..... Cleveland
Iron Fireman Mfg. Co. ..... Cleveland

Jervis Corp. ..... Grandville, Mich.

J. A. Kozma Co. ..... Dearborn, Mich.
Kux Machine Co. ..... Chicago

Latrobe Steel Co. ..... Latrobe, Pa.
Lester-Phoenix Inc. ..... Cleveland
Lindberg Engineering Co. ..... Chicago
Litemetal Diecast Inc. ..... Jackson, Mich.

Machine Design ..... Cleveland
Magnesium Industries Inc. ..... South Haven, Mich.
Martin Grinding & Machine Works Inc. ..... Chicago
Metal Pumping Services Inc. ..... Cleveland
Monsanto Chemical Co. ..... St. Louis
Morton Mfg. Co. ..... Omaha, Nebr.
National Lead Co. ..... New York
New Equipment Digest ..... Cleveland
Norman Leach Associates ..... Toledo, Ohio
Northern Tool & Die Co. ..... Flint, Mich.

Pangborn Corp. ..... Hagerstown, Md.
Penton Publishing Co. ..... Cleveland
Permanent Mold Die Co. ..... Hazel Park, Mich.
Precision Metal Molding ..... Cleveland
Precision Rings Inc. ..... Indianapolis
Productive Equipment Corp. ..... Chicago
Prospect Die & Mold Co. ..... Center Line, Mich.

Rebmann Products Corp. ..... Dearborn, Mich.
Reed-Prentice Div., Package Machinery Co. ..... East Longmeadow, Mass.
Renite Co. ..... Columbus, Ohio
Rex-Buckeye Co. ..... Cleveland

George Sall Metals Inc. ..... Philadelphia
Richard O. Schulz Co. ..... Elmwood Park, Ill.
Mel Shane Inc. ..... Detroit
Shaw Process Development Corp. Div., British Industries Corp. ..... Port Washington, N. Y.
G. W. Smith & Sons Co. ..... Dayton, Ohio
Society of Die Casting Engineers Inc. ..... Detroit
Southern Die Casting & Engineering Co. ..... High Point, N. C.
Steel ..... Cleveland
Sterling Inc. ..... Milwaukee
Sterling Detroit Co. ..... Detroit
Frederic B. Stevens Inc. ..... Detroit

Tornstedt Div., General Motors Corp. ..... Detroit
A. Triulzi S.A.S. ..... Milan, Italy

Udylite Corp. ..... Detroit
Union Steel Stamp & Die Engravers Inc. ..... Detroit
U. S. Department of Labor ..... Washington, D. C.
U. S. Reduction Co. ..... East Chicago, Ind.
Univertical Corp. ..... Detroit

Vesuvius Crucible Co. ..... Pittsburgh

Wayne State University ..... Detroit
Wolverine Die Cast Co. ..... Detroit

Fred C. Ziesenheim, ME ..... Marion, Ohio

Questions and Answers

Producing cast dies and tools in ceramic molds with close dimensional tolerances . . . Considering single furnace and molding method for ferrous and nonferrous alloy castings . . . Resisting heat . . . Casting needs feeding

Cast Steel Dies and Tools

It is our understanding that a new method has been devised for manufacturing pressure-casting dies as well as extrusion and drawing dies. Further we understand that steel component parts of the tools —punch and die—are cast directly in special ceramic molds (for example, natural Greenland cryolite). Process provides accurate parts requiring little subsequent machining. Can you give us any details on the process, and havc any articles been published on the subject?

Method of production of dies, molds, and tools you indicate is essentially investment molding which is adapted to use of permanent patterns instead of disposable ones made of wax or styrene. Refractories and bonding agents are the same as employed in investment molding practice. Main difference between the two processes is incorporation of a controlled gelling action in the case of that which uses permanent patterns so that the pattern can be removed from the mold without affecting the accuracy of the contour of the latter.

Your reference to use of natural Greenland cryolite as a refractory does not appear to have any basis since the pure variety is reported to have a melting point around 1000° C, which is relatively low in this consideration. The material is sodium aluminum fluoride. Molten cryolite is an excellent solvent for alumina and is used in reduction of bauxite to metallic aluminum, and in fluxes for aluminum. Some years ago we saw a mention of the use of green sand or glauconite in Germany as a refractory, but do not believe it is used to any extent. That mineral is an iron potassium silicate, primarily used as a water-softening agent.

Some details of several processes employed in producing dies, molds, and tools by casting have been published in FOUNDRY. They include "Shaw Process Foundry Provides Economies for Tool Shop"—September, 1958; "Ceramic Mold Process Offers Improved Casting Properties" —June, 1959; and "Production and Application of Ceramic Mold Castings"— October, 1960.

Convert Forgings to Castings

We are planning to build here in Turkey a small foundry to cast all kinds of automotive parts. Because the quantities of those are not large, we would like to operate with the minimum equipment and tools, and we are considering a 100 or 200-kw induction furnace to melt steel, cast iron, aluminum and copper-base alloys. Can you tell us if it is possible to make such an arrangement using modern casting methods and equipment? Is it possible to convert such forged parts as gear blanks, steering knuckles, yokes, connecting rods, camshafts, crankshafts, axles, etc., to castings safely and economically? Is it possible to cast continuously blanks for railroad screw spikes weighing a pound and steel balls for cement mills in permanent molds or in shell molds? Is there any source in the United States for technical information and assistance?

Conversion of forged steel parts such as camshafts, crankshafts, connecting rods, etc., to castings can be accomplished by selection of suitable compositions which will result in desired properties, and appropriate molding procedures, but whether or not those castings can be produced at a cost competitive with the forgings is another matter. Answer to that only can be determined by careful analysis of all costs involved.

Selection of a high-frequency electric induction furnace as the melting medium, even though its initial cost is high, does offer as you indicate the advantage of only one unit to melt both ferrous and nonferrous alloys. However, to prevent contamination of the several alloys it will be necessary to use separate lined furnace shells for the cast iron and steel. The copper-base and aluminum alloys can be handled in separate crucibles.

Adoption of the shell molding process for making the castings will facilitate the maintenance of close dimensional tolerances and smooth surfaces. Again, it might be pointed out that costs for shell molding probably will be higher than for green sand molding, but to an appreciable degree those costs will be offset by reduced cost in machining and other operations required to finish the castings for application.

With reference to production of steel railroad screw spikes and balls for grinding mills, we do not believe that metal or permanent molds would be satisfactory due to the high temperatures involved. Shell molding should be a good method of producing those castings. The screw spikes could, we believe, be made with the screw threads rather than as blanks. That would eliminate machining to form the threads.

As far as technical and other assistance is concerned, we believe that in view of the several problems involved, it will be worthwhile to engage the services of a foundry engineering firm to study the situation and advise the most suitable procedure. There are a number of such firms in this country and their names and addresses may be found in the advertising section. Possibly some of the manufacturers of fur-

naces and shell molding equipment may have some information which might be of value.

Improving Heat Resistance

We are having some difficulty with cast iron grates which we make for our slow combustion stoves in that the life is not long enough. We use a stoveplate analysis showing around 2.50 per cent Si, 3.30 per cent TC, 0.38 per cent Mn, 1.1 per cent P, and 0.056 per cent S. That is employed for our other castings, and we do not want to change that. Could we produce a satisfactory composition for the grate bars through ladle additions?

We believe it is possible for you to improve the heat resisting properties of your present iron by additions of carbide stabilizing agents such as chromium, possibly modified with some type of graphitizing agent. Some time ago use of 1 per cent chromium in combination with a like amount of nickel was recommended for addition to a base iron of composition similar to yours, which was for manufacture of fire pots for gray iron, hot-air household furnaces.

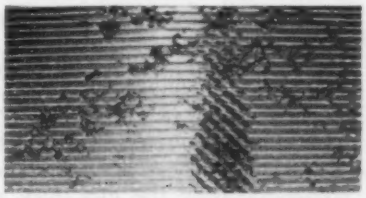
Again, you should be able to gain considerable benefit by addition of chromium alone, but you will have to do some experimenting to determine the amount which will provide the desired results. As you know, chromium is a strong carbide stabilizer; if too much is added to your iron, a white structure will result. Therefore we suggest try making various additions, say starting at 0.5 per cent, fracturing the grate bars, and observing the structures which result. We believe that one which shows a slight mottle should show a considerable improvement in grate bar life.

Bronze Casting Shows Shrink

We are forwarding a piece of a manganese bronze casting for examination. When using this particular type of bronze we find that dross often appears in the casting, and we will appreciate suggestions on eliminating this condition.

As you undoubtedly know, manganese bronze is classified as one of the high-shrinkage alloys; it needs careful attention to gating and risering to insure sound sections. Also, due to the high zinc content and presence of aluminum, the gating must permit the metal to flow into the cavity without turbulence or impingement on projecting parts of the mold.

In our opinion, your main trouble is shrinkage rather than dross or inclusions, and we suggest that you study your gating system to find the remedy. We do not know the size or shape of the casting, so little can be offered. Manganese bronze castings preferably are gated so that the metal enters at the lowest point and as smoothly as possible. It is best to gate into a riser close to the casting so that feeding with hot metal will be insured.



Shrinkage is revealed by machining

Pouring temperature should be as low as possible while still obtaining sound castings. High temperatures cause heavy evolution of zinc fumes which do not help the foundry atmosphere, the employees, or the castings. Gates should be larger than those for red brass so that the casting cavity can be filled rapidly, and the gating system should be choked close to the sprue to hold back any dross.

One method of preventing dross from entering the gating system is to employ a pouring basin with a plug in the sprue opening. The plug is pulled out when the basin is almost full of molten metal, and filling of the basin is continued when the plug is out.

Loss of Manganese Is High

We operate a gray iron foundry producing construction castings. In the past our raw material was cast iron scrap of a very dense and heavy nature. Recently we have attempted to change to steel scrap due to economic considerations.

Our charging door is about 16 ft above the tuyeres, and with cast iron scrap we were able to maintain about 12,000 lb of melting stock in the stack. However, with the steel scrap we are able to hold only about 4500 lb. The extra coke also takes up space. With the iron scrap we tapped 9 tons per hour, which meant that the average material was in the cupola 40 minutes, raising it to a temperature of 2700° F. With steel scrap the melting rate is reduced to 7.8 tons per hour, but the average material is in the cupola for only 23 minutes for the same temperature.

We are having manganese trouble, but our slag remains light with no indication of oxidation. We have read many articles on cupola melting, and while frequent mention is made that the charging door should be between 16 ft and 22 ft, there is no mention of correlation of the weight of charges in the stack and the melting rate. It seems to us that somewhere the problem of cheaper and bulkier material must have been recognized, and wonder if you could give us any information.

Also can you suggest what happens during melting which causes losses of 60 to 70 per cent manganese when carbon pickup is satisfactory and silicon loss holds close to 10 per cent?

Although you do not mention the type of steel scrap you are using for your charges, your description indicates that it is light and therefore bulky. That also is borne out by some figures which show weights of light railroad steel scrap as 45 lb per cu ft, automobile steel scrap as 42 lb per cu ft, and compressed steel bundles as 50 lb per cu ft. For heavy railroad steel scrap the weight is 85 to 90 lb per cu ft, steel rails 132 lb per cu ft, and steel foundry gates and risers 135 lb per cu ft.

A rough calculation, assuming a 48-in. diam cupola, indicates that with the heavy gray iron scrap the material weighed a little over 100 lb per cu ft while with the steel scrap the weight is about 41 lb per cu ft. Possibly you might be able to increase the density of the scrap by cutting it into shorter pieces and thus prevent hanging and bridging.

According to *The Cupola and Its Operation*, the maximum dimension of the metal pieces should not exceed one-third of the inside diameter at the melting zone. The diagonal is the greatest dimension for rectangular or square pieces.

We do not recall any discussion of the relationship between the amount of metal in the stack and

the melting rate. Melting rate of a cupola usually is based on the cross-sectional area at the melting zone, and the figure commonly used is 10 lb per sq in. per hour. For example, a 48-in. diam cupola has a cross-sectional area of 1809 sq in., and the melting rate is about 9 tons per hour.

One point made quite clear in discussions of cupola melting is that the metal composing the charges should not be too light in section since such material tends to oxidize readily under the high temperature conditions, and the oxidized material either is blown out the stack or absorbed by the slag.

The figures you mention on the times the two irons are in the cupola, although true as averages, have little to do with actual melting. Investigations by Lownie and others show that melting occurs only in the melting zone of the cupola. In Lownie's work it was indicated that pig iron in the charges starts to melt at 2050° F and steel at 2400° F. Between those points and up to the charging door, the metal is being preheated by the ascending hot gases. This preheating in theory and in practice produces iron at a higher temperature than when it does not occur.

It might be pointed out that when melting at a rate of 9 tons per hour it will take 15 minutes to melt 4500 lb of iron, and at a rate of 7.8 tons per hour it will require 17 minutes for the same amount of iron—so the difference in time is not nearly as great as your figures seem to indicate.

We suspect that the high manganese loss with normal silicon loss and carbon pickup is due to the increased amount of coke being used. The manganese combines with the sulfur in the coke to form manganese sulfide, is absorbed in the slag, and converted to MnO, which, according to available information, is grass green in color and not black.

Contamination Is Possible

We regularly melt bronze in a 400-lb indirect arc electric furnace, and now we have a call for a special iron alloy which cannot be handled in the cupola. We hesitate to melt that iron alloy in the bronze furnace because we are afraid that the following heat of bronze will be contaminated with iron. Is our suspicion well founded? Is there any way to overcome the danger of contamination?

We are in accord with your remark that there will be an iron pickup in the bronze heat following one of iron. It will be difficult to remove all the slag associated with the melting of the iron. Iron also will be present in the cracks and crevices in the lining, and iron will be absorbed by the lining. In addition, the iron heat will pick up copper, tin, zinc, and lead from the lining and slag residues from melting bronze. Whether or not the pickup in the two cases will be great enough to cause difficulty in meeting specification limits can be determined only by analyses of the alloys involved under operating conditions.

So far as we know, the only way of minimizing the possibility of contamination is to melt "wash" heats of the same composition which will follow. That is, with the bronze following the iron, melt a small heat of bronze, pour it into castings in which the higher iron content would not be of importance, then follow with the regular bronze heats. If the iron is subject to limitations on copper, etc., use a small wash heat of ordinary gray iron, then follow with the special alloy.

Production of Metal Shot

We are interested in producing shot from molten cast iron in our own foundry, but have no knowledge of the necessary techniques or equipment. The shot desired would require no specific mechanical or chemical properties since it would be used only in counterweights. The size should be approximately ⅛ in. diam or under so that the maximum weight per unit volume of shot could be obtained.

Our plan would be to use over-iron or nonspecification iron to make the shot rather than pigging the metal. Such iron may vary considerably in temperature and composition, depending on the point in our operation at which it was melted. Would such variations seriously affect the production of shot? We would probably want to shot the iron in amounts ranging from 200 to 1500 pounds of iron at a time.

Commercial chilled shot for blasting or peening purposes usually is produced by breaking up small streams of molten metal flowing from a "splitter box" on the cupola spout by streams of high-pressure water or by steam jets. The metal particles or shot fall into tanks of water for further cooling.

Another procedure is to let the molten streams drop on a rapidly rotating disc over which water is flowing. The shot is retrieved from the water tanks, dried, and sized by screening. Over-size shot is crushed to make grit. Size of the shot is controlled by the height that the metal stream drops before being struck by the water jets, by the pressure of the water, and the metal temperature.

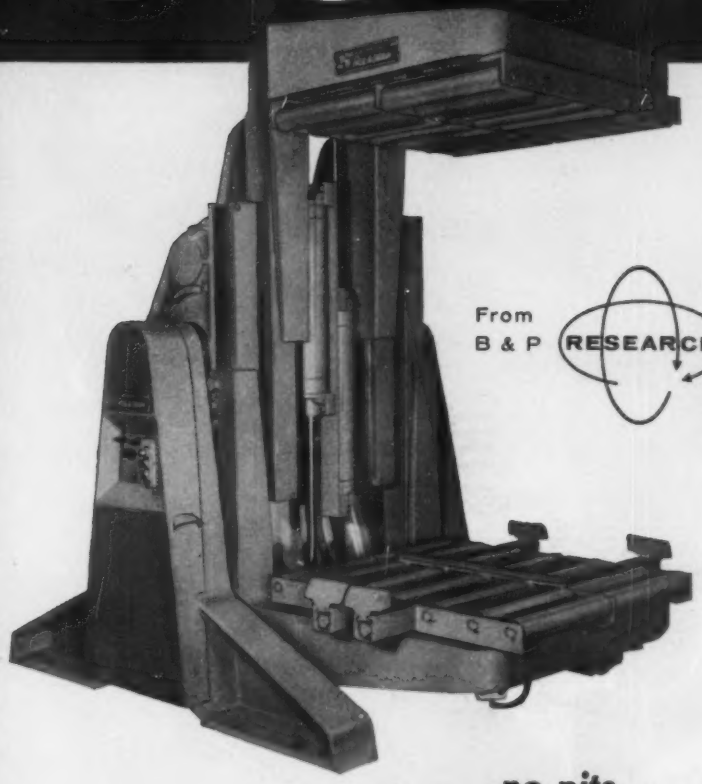
Obviously, manufacture of shot is a specialized operation, and would have to be located away from regular foundry operations due to the presence of considerable quantities of water, and to sparks and steam created during the process. As indicated earlier, equipment for drying the shot and screening apparatus for separating the shot into suitable sizes also will be required.

Metal temperature would have some effect on the operation in that the lower the temperature, the more difficult it will be to break the metal stream into small particles. Possibly water at higher pressures might help, but with metal at different temperatures, it would require constant adjustment. Of course, the only way to determine that would be to carry on some experimental work.

The splitter mentioned earlier is a refractory-lined box on the cupola spout which divides the stream from the cupola into several smaller streams about ½ in. in diam. The metal flows horizontally from the box a short distance and then drops in an arc into water jets located immediately below each stream.

Since chilling of the shot is not necessary in your case, you might try compressed air jets to break up the metal stream. Again you might try a rapidly rotating copper disc onto which the molten metal is poured in a small stream. Size of the shot can be controlled by the distance from the axis of rotation at which the metal falls. It hardly seems necessary to point out that the disc will have to be enclosed on the top and periphery for safety reasons.

CUT THE COST OF MOLD HANDLING



From B & P RESEARCH

no pits . . .

easy, inexpensive installation

Circle 626 on Page 55

ALL-HYDRAULIC ROL-A-DRAW

FAST, COMPLETELY AUTOMATIC CYCLE . . . cuts production time, ends costly errors.

As part of a new, modern installation, or as an addition to existing equipment, the flexible Rol-A-Draw cuts mold handling costs to an unbelievably low figure. Available in capacities up to 15,000 pounds, the Rol-A-Draw will accommodate any flask within its wide range without machine adjustments. Clamp, roll-over, draw, mold ejection and pattern return are accomplished by push-button-actuated automatic cycle control thus saving time and manpower. Crane delays are cut or eliminated and other handling costs are sharply reduced to provide big savings. Smooth, accurate pattern draw assures perfect mold surfaces . . . eliminates mold repair.

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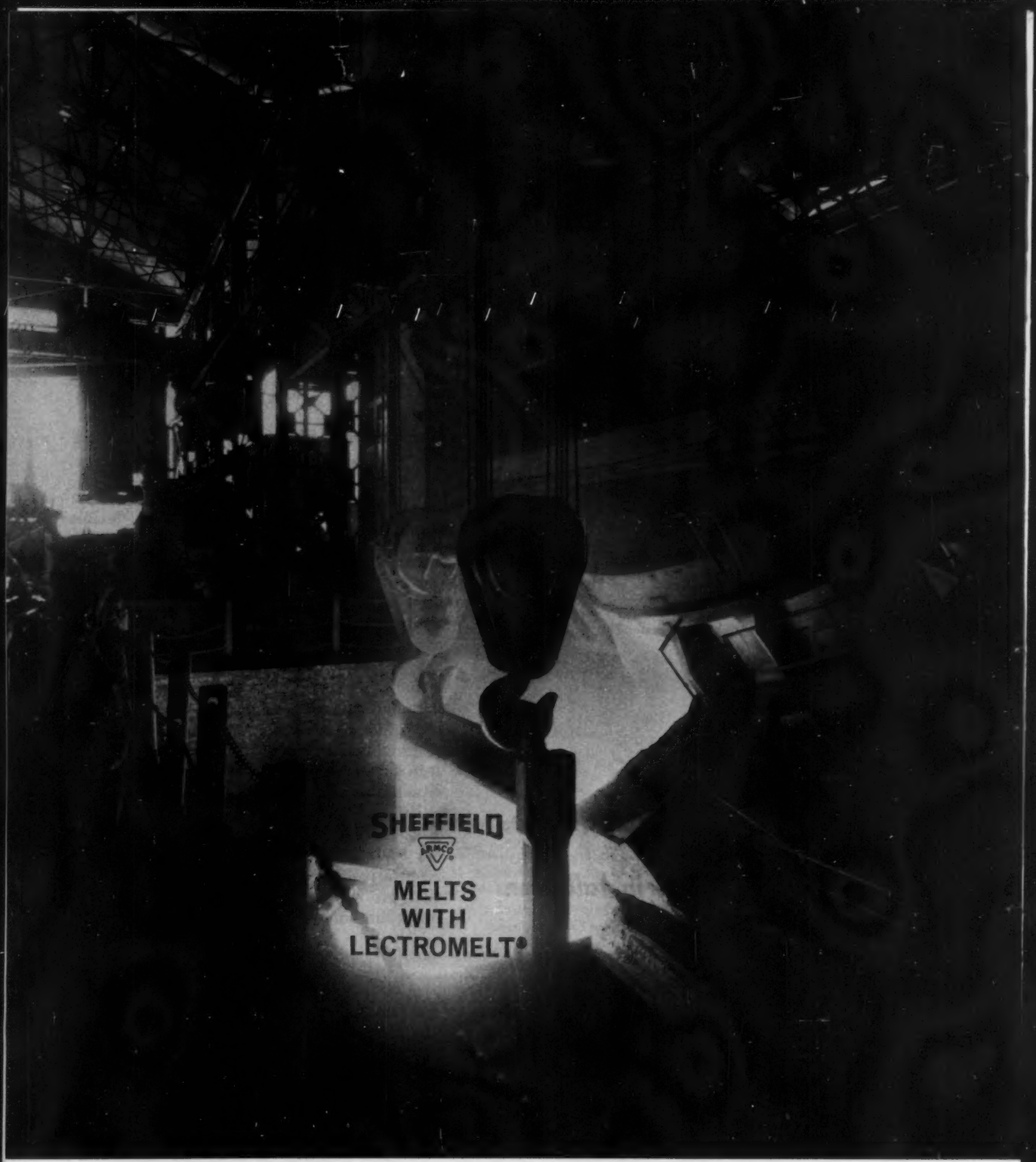
meets all production requirements . . . uses existing patterns and flasks . . provides outstanding accuracy

BEARDSLEY & PIPER Div. of Pettibone Mulliken Corp. 2424 N. Cicero Ave., Chicago 39, Ill.



At the Houston works, Sheffield Division, Armco Steel Corporation, two 20-foot Lectromelt furnaces contribute high availability, accurate control and fast turn-around to volume production of high quality steels. For recommendations on furnace equipment for melting or smelting, get in touch with Lectromelt, world's largest manufacturer of electric furnaces exclusively. Lectromelt Furnace Division, McGraw-Edison Company, 326 32nd Street, Pittsburgh 30, Pennsylvania.

WHEN YOU MELT... Lectromelt McGRAW EDISON

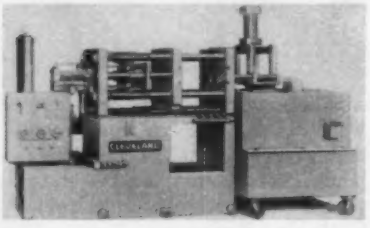
Circle 627 on Page 55

For More Information Use
Reader Service Card—Page 55

What's New in Equipment and Supplies

DIECASTING MACHINE

Diecasting machine Model 100 is available as a standard or fully automated hot chamber machine; as a standard cold chamber machine; or as a cold chamber machine equipped with vacuum die evacuation, with or without automatic aluminum ladling. Unit is said to have a locking pressure of better than 100 tons and to cycle over



1000 shots per hr. Standard plungers give shot capacities of 2.6 lb of aluminum and 4.2 lb of zinc. The machine has 22 x 23-in. die plates and can accommodate dies 4 to 19 in. thick. Optional equipment includes a single unit conveyor and water quench box, a stripper for removing castings from the die, low pressure die closing, and automatic die and machine lubrication. —**Cleveland Automatic Machine Co.**, 4932 Beech St., Cincinnati 12, Ohio.

For More Details Circle No. 450—Page 55

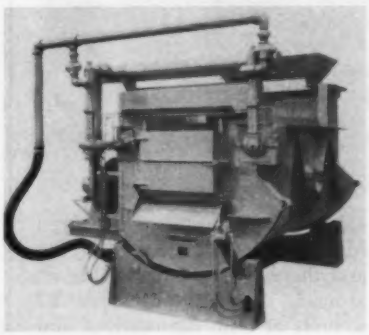
PLUNGER TIPS

Plunger tips generally employed in the pressure systems of cold chamber diecasting machines have been improved by the addition of copper-base alloys. These alloys reportedly possess tensile strength of 110,000 through 190,000 psi, yield strengths of 65,000 through 120,000 psi, and thermal conductivities of 0.18 to 0.46. The tips are installed in cylinder wells or sleeves. Use of these copper alloys in plunger tips is claimed to result in elimination of seizure from galling and distortion, less need for graphite lubrication, cooler tips, and no iron pickup during aluminum casting.—**Ampco Metal Inc.**, 1745 S. 38th St., Milwaukee 46, Wis.

For More Details Circle No. 451—Page 55

MELTING FURNACES

Reverberatory melting furnaces are designed for use in sand casting, die casting, and permanent molding plants. Available in gas, oil, or combination fuel-fired models, the new furnaces feature direct firing which is said to provide fast, economical melting and holding of aluminum within a single chamber furnace. Depending on type and size, these furnaces are capable of



melting 150 to 3000 lb of aluminum per hour with bath capacities ranging from 650 to 5000 lb of molten aluminum. All furnaces include burner equipment, gas pilots, first quality firebrick or silicon carbide lining, and a centrifugal blower. Combustion safeguards and automatic metal temperature controls can be provided.—**Hevi-Duty Electric Co.**, a division of Basic Products Corp., Milwaukee 1, Wis.

For More Details Circle No. 452—Page 55

FORK LIFT TRUCK

Industrial Model 430 fork lift truck is available with either a 38.5 hp gasoline engine or a 41.5 hp diesel engine. Choice of mast

heights for maximum lifts to 10½, 14¼, or 21½ ft is offered. Lift capacity in the first two stages is 4000 lb and in the third stage is 2500 lb with lift speeds up to 48 fpm. Standard features include power steering, synchronized shuttle shift, nondirectional 13:00 x 24 tires, solid axles, and 48-in. forks. Optional equipment includes 36 or 42-in. forks, side shift attachment, tilt fork attachment, and special tires. Also available is a ½-yd materials bucket, ½ or 1/3-yd concrete bucket, block forks, crane boom, and angledozer blade.—**J. I. Case Co.**, 700 State St., Racine, Wis.

For More Details Circle No. 453—Page 55

PRODUCTION RECORDER

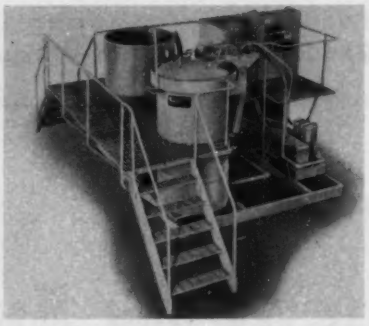
Multiple recorder and annunciator records production rates of a number of machines throughout a shift or day on one chart. It also

relates production rate to temperature, amperage, speed, or other significant variables. Unit is available in different sizes to record from 10 to 400 quantities in 4 x 6-in. chart frames printed in columns and rows on a large sheet of paper. The large chart, up to 4 x 6 ft, is held against a translucent platen, and traces consisting of closely spaced dots are printed at rates up to ten points per second by electrically operated printers. Traces can be printed in different colors so that related variables can be plotted on the same chart. Annunciator alarms also can be provided.—**Keinath Instrument Co.**, Columbus, Ohio.

For More Details Circle No. 454—Page 55

IMPREGNATOR

Automated impregnation unit is designed to process unmachined aluminum die castings at the rate of 56 cu ft of castings per hr. Unit is designated Model S-280-EAA and employs electric, steam, or gas heat. All working valves are activated by solenoids and are operated by air



cylinders. Timing cycles can be varied to obtain the best impregnation. Unit's vacuum pump is capable of producing 29.5 in. Hg in the chamber in less than five minutes.—**Imprex Inc.**, 2023 S. 60th St., Milwaukee 19, Wis.

For More Details Circle No. 455—Page 55

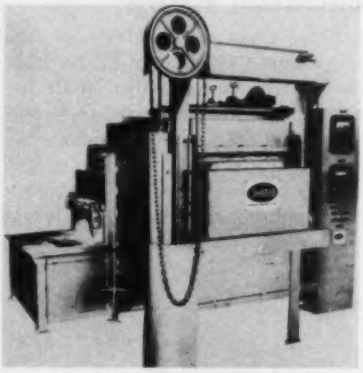
ADJUSTABLE BELT IDLER

Limberoller bracket called the Varytrough is adjustable so that trough angle of the conveyor belt on the idler can be increased from the normal 20 degrees up to 45 degrees. It is said to increase the conveyor system capacity by 26 per cent without expensive belt construction or the disadvantages of steel rolls at steep angles. Adjustability to deep troughs at loading points aids in eliminating spillage and wandering belts caused by off-center loads. Uniform contact of idler and belt prevents belt "jiggling" and premature cable failure. — **Florida Conveyor & Equipment Co.**, Mulberry, Fla.

For More Details Circle No. 456—Page 55

ALUMINUM MELTING FURNACE

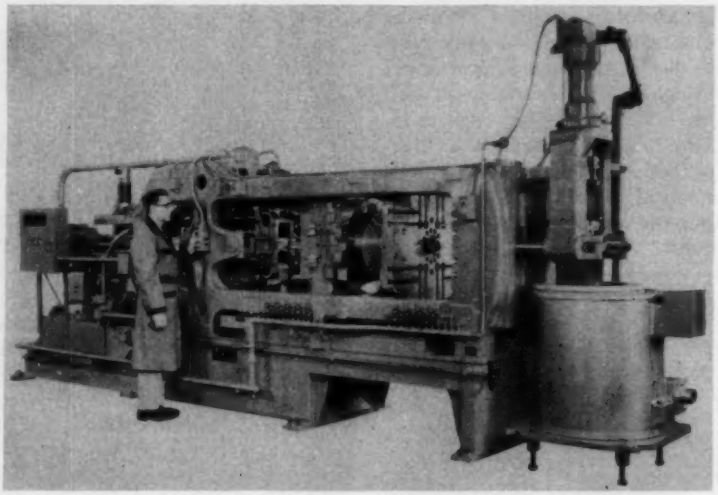
Furnace for melting and holding aluminum will operate on gas, oil, or combination fuel. Unit can be



supplied with end or side-dipout wells to fit floor space requirements, and it can be adapted to continuous-pour operation. Sloping hearth and temperature control are features.—**Sunbeam Equipment Corp.**, 180 Mercer Street, Meadville, Pa.

For More Details Circle No. 457—Page 55

Diecasting Unit Has Adjustable Die Opening



Zinc diecasting machine delivers 450-ton clamping pressure and provides a die opening stroke adjustable from 8 to 30 in. to produce deep draw parts weighing up to 15¼ lb. Unit incorporates a self-aligning zinc end requiring only one adjustment for final set-up. Maximum die height is 30 in., adjustable to minimum die height of 9 in. with aid of 3, 6, and 9-in. spacer rings. Movable platen is 38 x 40½ in., and the die space is accessible all around. Machine cycle is 5.7 seconds at 8-in. die opening and 7.5 seconds at 30-in. opening. Nitrogen accumulator has a capacity of 5280 cu in. — **Lester-Phoenix Inc.**, 2711 Church Ave., Dept. N-14, Cleveland 13, Ohio.

For More Details Circle No. 482—Page 55

LIFT TRUCKS

Lift trucks of 3000, 4000, and 5000-lb capacities are available with 52-hp gasoline or LP gas engines. Standard transmission has two speeds each in forward and reverse, or an automatic transmission can be installed. Other features include independent, internally expanding emergency brake, oil filter for the hydraulic system, and key-type starter switch. — **Engine-Material Handling Div., Allis-Chalmers Mfg. Co.**, Milwaukee 1, Wis.

For More Details Circle No. 458—Page 55

AIR HOISTS

Push-type trolley suspension is incorporated in model added to company's line of Budgit air hoists. Additional headroom of 2 in. is claimed

...Fluid Power news

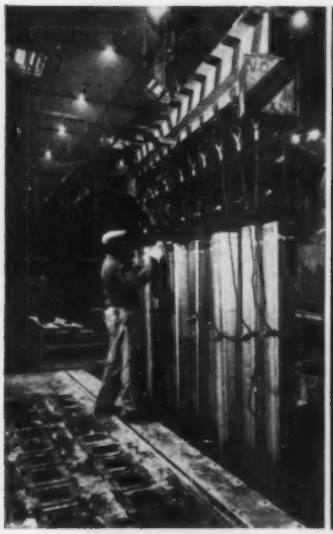
REPORT NO. 11,805 CASTING FEEDS NOT AFFECTED BY LOAD VARIATIONS

From Oilgear *Application-Engineering* Files

HOW OILGEAR SYSTEMS IN KAISER ALUMINUM PLANTS AID DIRECT CHILL BILLET CASTING PRODUCTION

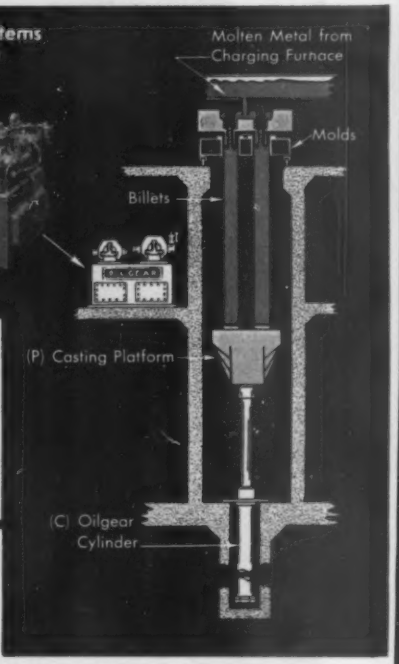
USER: *Kaiser Aluminum & Chemical Corporation*

PROBLEM: To supply direct chill billet casting platform power and control systems for production of a major portion of the 1,050,000,000 lb of aluminum consumed annually by domestic extruders. Direct chill billet quality — avoidance of internal cracking, homogeneity, grain structure fineness and orientation — depends on a smooth, unvarying, precise platform feed rate, careful control of pouring speed and temperature, cooling rate, and other variables to prevent atmospheric oxidation and impurities. Up to 32 billet logs over 18 ft long are to be produced in a single cast. POWER AND CONTROL SYSTEM REQUIREMENTS: 1. Remote pushbutton control of all functions. 2. Rapid platform traverse up and down. 3. Infinite "down" feed rate selection — unvarying regardless of casting platform load increase; chatter-free — unaffected by off-balance platform loads. 4. "Fail-safe" — insuring completion of a cast in event of power failure. 5. Must be simple, and assure long, trouble-free, dependable service.



Above: Rapid traverse is used to raise the casting platform, bringing, in this case, the 6-in.-sq. by 18-ft billet logs out of the casting pit for identification with cast number at one of three direct chill casting stations at Kaiser Aluminum's Chalmette, La., Works. Direct chill "molds" are clearly visible behind the "marker."

Application-Engineered Fluid Power Systems For Direct Chill Casting Stations



HOW IT WORKS: The Oilgear Variable Displacement Pump (1) on "Power-Pak" (A) provides adjustable preset slow and fast speeds for raising and lowering casting platform (P). Oilgear Variable Displacement Piston-type Precision Metering Pumps (2) are connected in series hydraulically between Oilgear Cylinder (C) and "Power-Pak" (A) Reservoir. Ram down-feed during casting is dependent upon control setting of the Secondary Metering Pump — remotely pushbutton-controlled to provide instant, precise, feed rate adjustment... indicated in ipm on a direct reading indicator. Oil, increasing in pressure as the billet load increases, flows from Cylinder (C) through sealed, "pressurized," Primary Metering Pump — and then, at relatively constant low pressure, through the Secondary Metering Pump to "Power-Pak" (A) Reservoir — providing an extremely accurate casting feed rate regardless of varying platform load. An automatic, Oilgear hydraulic control varies Primary Metering Pump displacement to compensate for load variation and feed rate selected. "Fail-safe" operation is provided through Oilgear Valves.

SOLUTION: Oilgear's patented Feed and Control System provides accurate volumetric metering of pressurized oil over a 200:1 pressure range, and a 100:1 feed range. Installations consist of an Oilgear Variable Displacement Pump direct-connected to an electric drive motor, two Oilgear Precision Variable Displacement Metering Pumps direct-connected to a double-end synchronous electric motor — all mounted on a custom-built reservoir base (A); and Oilgear piston- and ram-guided, chatter-free, *Custom-Quality* Cylinder (C); Oilgear Valves and Controls... all thoroughly, carefully *Application-Engineered.*

USER REPORTS — "Where accumulating load on the platform varied oil pressure from 50 to 1500 psi, and the rate of metering was preset anywhere from 50 to max. cipm, *there was no measurable change on the preset rate of casting feed during any portion of the stroke.*"

There has been NO major maintenance on these heavy-duty Oilgear Systems operating continuously in Kaiser Aluminum plants across the nation — some for over 7 years — and still "going strong."

THIS PATENTED OILGEAR METHOD of precise metering — and other accurate Oilgear Control Systems — have been applied to a wide range of applications in many industries where varying loads must not affect the speed of linear movement or hydraulic motor rotation. Carefully Application-Engineered Oilgear Systems — also used extensively on extrusion presses... aluminum foil laminating machines... stretching, forming, drawing and spinning presses... can-closing and filling machines... metal briquetting presses... ladle tilting, ingot manipulators, strippers, and scalpers — have all proved Oilgear equipment's traditionally long life, prompting users to state —

"for the lowest cost per year... it's Oilgear!"

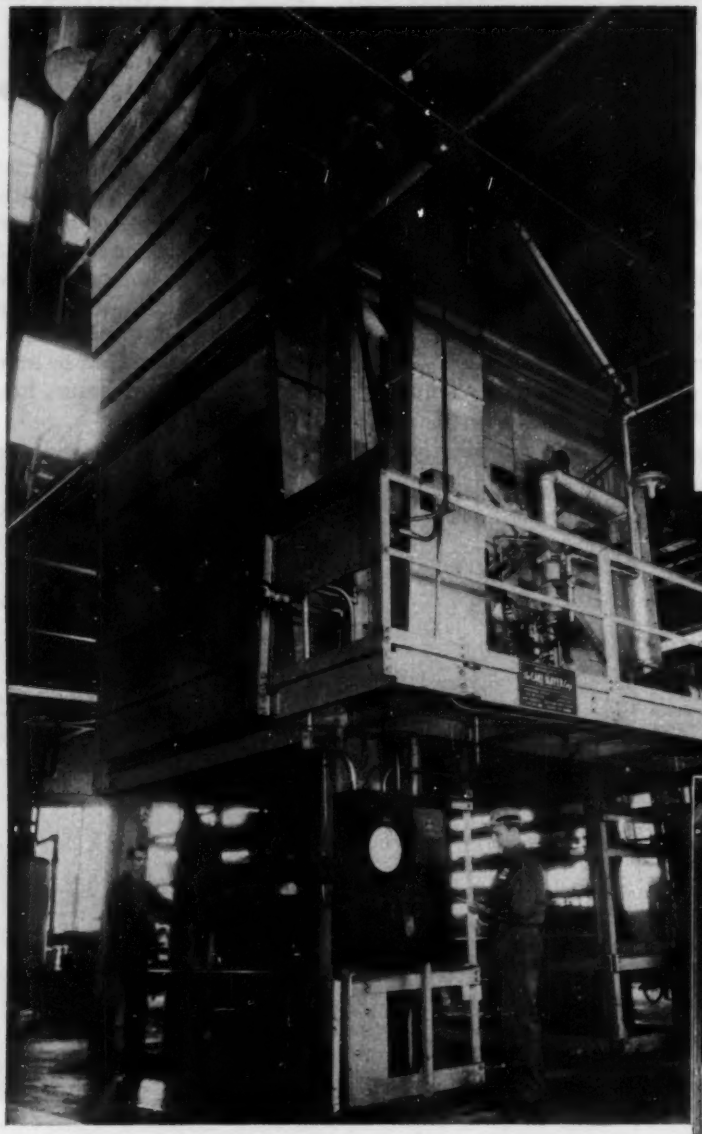
For similar practical solutions to YOUR linear or rotary motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements directly to...

THE OILGEAR COMPANY
Application-Engineered Fluid Power Systems
1573 WEST PIERCE STREET • MILWAUKEE 4, WISCONSIN
Phone: Mitchell 5-6715... Direct Distance Dialing Code 414

Circle 628 on Page 55

Foundry-Proven Money Makers!

Ovens Designed by carl mayer CORP.

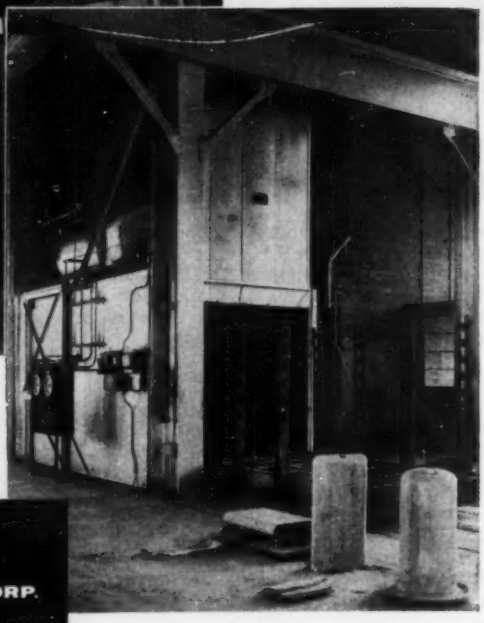


The Carl Mayer Corp. experience in engineering and designing industrial ovens and furnaces is second to none! Carl Mayer ovens incorporate recirculating heating systems with sealed combustion chambers and automatic temperature controls for all fuels. Cores and molds are evenly baked faster, with less fuel consumption.

Many foundries of all sizes have found it pays to install Carl Mayer ovens—Our engineers will be glad to work with you on your oven problems. Write or call now!

Write for Bulletin 53-CM

A NEW VERTICAL CORE OVEN Installed at Forest City Foundry, Cleveland, Ohio. Size is 12' 7" x 11' 10" x 57' 8" high above floor. 29 carriers, 3 shelves high; each shelf 30 x 106 inches. Features forced cooling and exhaust system for uniform cooling of cores before unloading.



CAR TYPE MOLD OVEN at American Brake Shoe Co. features under floor chain car puller. Size 10' x 10' x 19' long.

THE carl mayer CORP.

20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

when the hoists with integral trolleys are used. Construction features include an aluminum frame, steel gearing, vane-type air motor, built-in muffler, shoe-type load brake, steel link-type chain, steel load hook, one-hand control cord, and upper and lower limit stops. Spark and corrosion resistant models also are available. — **Shaw-Box Crane & Hoist Div., Manning, Maxwell, & Moore Inc.**, Muskegon, Mich.

For More Details Circle No. 459—Page 55

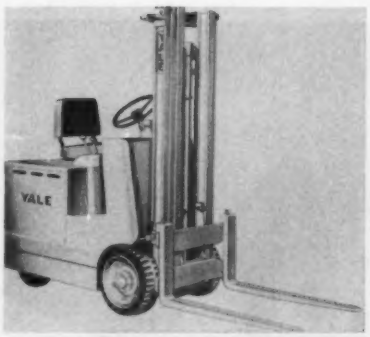
MAGNETIC SWEEPER

Magnetic floor sweeper is used for recovering steel shot spilled on the floor around shot blast cleaning equipment. The sweeper also picks up magnetic metal scrap. Unit uses a permanent magnet mounted in a two-wheeled chassis equipped with a long handle. — **American Magnetics Co.**, Box 254, Moline, Ill.

For More Details Circle No. 460—Page 55

LIFT TRUCKS

Electric lift truck Model K-58 (shown here) is available in 2000, 2500, and 3000-lb capacities. Lift



speeds to 150 fpm empty and 95 fpm fully loaded are featured. Model G-54, a gasoline or LP-gas powered lift truck with automatic transmission, is offered in capacities of 3000, 4000, and 5000 lb.—**Yale & Towne Mfg. Co.**, 11000 Roosevelt Blvd., Philadelphia 15, Pa.

For More Details Circle No. 461—Page 55

THERMOCOUPLES

Thermocouple wire and thermocouple elements are ISA standard grade calibration wire, encased in magnesium oxide and processed into a chemically clean outer sheath. Wire can be formed on a radius equal to its own diameter and brazed by inert arc, electric arc, or oxyacetylene methods without loss of insulation resistance or dielectric strength. Iron-constantan elements can be used through a range of 75 to 1600° F and chromel-alumel elements between 1000 to 2500° F. Line of elements and assemblies is available in a variety of styles, sizes, and lengths.—**Wheelco Instruments Div., Barber-Colman Co.**, Rockford, Ill.

For More Details Circle No. 462—Page 55

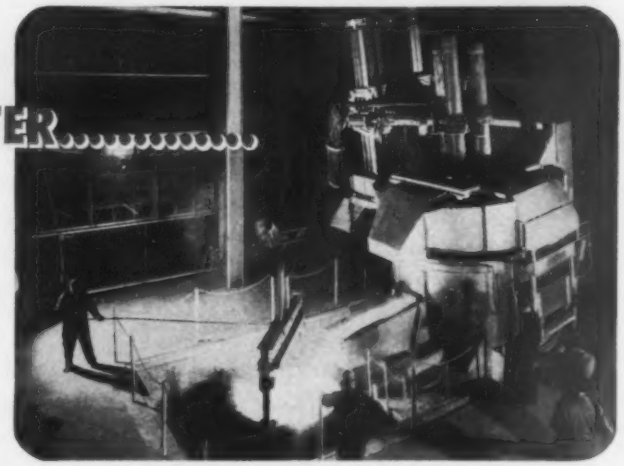
ALTERNATING CURRENT MOTOR

Squirrel-cage motors in 2 or 3-phase alternating current, 1 through 125 hp are encapsulated in an epoxy compound applied under vacuum to surround each wire in slots and at coil ends to produce a solid, void-free mass. The manufacturer claims that these motors have the simplicity and high overload service features of open motors, yet provide the winding protection of enclosed motors. The motors are said to be usable for applica-

EXECUTIVE REPORT #23

THE FOUNDRYMAN'S FILTER

Wheelabrator® Dustube® Collectors trap electric furnace dust and fume



Foundrymen who are concerned with costs rely on Wheelabrator Dustube Collectors to meet their local air pollution codes, and provide clean, dust-free air in the foundry, at the most favorable balance of cost to collection efficiency.

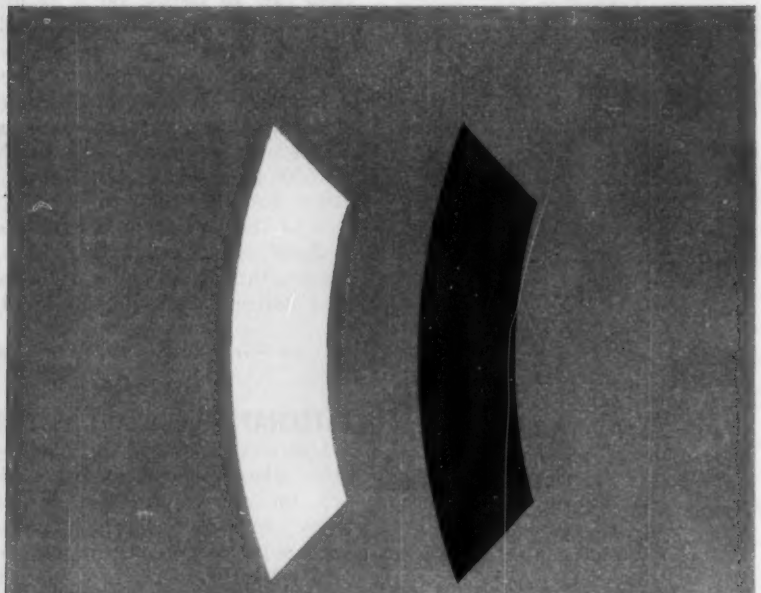
With a Wheelabrator electric furnace ventilation system, a discharge free of visible solids is insured. This hood and exhaust system will not restrict furnace operation and maintenance, nor affect metallurgy. Easy furnace roof replacement, maximum furnace roof life, minimum hood maintenance are assured.

Wheelabrator Dustube Collectors are in use today in 44 foundries, on some 64 electric furnaces . . . your assurance of complete furnace fume control.

WHEELABRATOR EXPERIENCE IS AT YOUR SERVICE

This knowledge of electric furnace fume control is at your disposal. Call your local Wheelabrator Dust and Fume Engineer. Or, write to WHEELABRATOR CORP., 505 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
DUST AND FUME CONTROL



Which looks bigger to you?

in buying blast cleaning abrasives, too, low price is just an illusion

It's abrasive quality that really matters. Take hardness, for instance. Top quality Wheelabrator Steel Shot is the hardest steel shot ever made — almost 10 RC harder than lower priced steels. It hits harder, cleans faster, rebounds better to clean hard-to-reach areas. And it lasts much longer than softer abrasives.

For faster production and better finish — for *true* blasting economy, use high quality Wheelabrator Steel Shot. Prove it in your own equipment.

WRITE TODAY FOR THIS NEW HANDBOOK
of blast cleaning abrasive performance data, full of charts and facts to help you control abrasive consumption and cleaning costs. *Write to Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind. In Canada, write to Wheelabrator Corp., Canadian Div., P.O. Box 490, Scarborough, Ontario.*

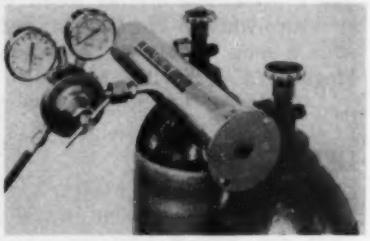
WHEELABRATOR
STEEL ABRASIVES

tions involving exposure to excessive heat, moisture, acids, gases, salts, alkalies, caustics, fine abrasives, shock, or vibration. The motors are available in NEMA designs A, B, C, and D for one, two, three, or four-speed constant or variable torque operation in all standard voltages and frequencies. — **Howell Electric Motors Co.**, 16316 W. Seven Mile Rd., Detroit 35, Mich.

For More Details Circle No. 463—Page 55

CO_2 MANIFOLDS

Manifolds are heated electrically to prevent CO_2 regulator freeze-ups. Different sizes are available for two and four-bottle systems. Both manifolds are one-piece units which work



with any set of standard regulators and come equipped with all necessary fittings, gaskets, and electrical wiring. Heating is accomplished by an electrical element built into the manifold.—**World Electric Co.**, 4614 Prospect Ave., Cleveland 3, Ohio.

For More Details Circle No. 464—Page 55

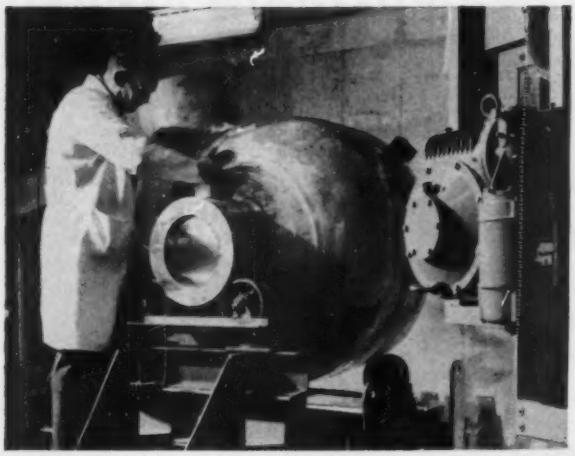
MERCURY LAMPS

New line of industrial mercury lamps is said to have longer life at lower cost. A larger cathode, double-wound and filled with a new electron-emissive material, prevents blackening of the arc tube as the lamp ages. Also, a disk is included to reflect light that might otherwise be trapped in the bulb neck and base. Other features include weather-resistant glass, mechanical base, low-temperature starting, and an improved resistor.—**General Electric Co.**, Nela Park, Cleveland 12, Ohio.

For More Details Circle No. 465—Page 55

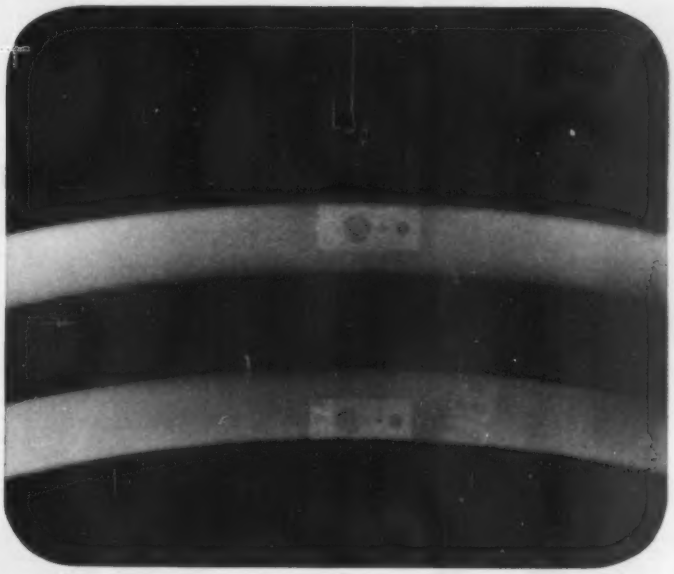
OPTICAL PYROMETER

Two-color optical pyrometer is offered for automatic, continuous measurement and control of temperature in the ranges from 1400 to 4500° F and from 750 to 2500° F. Two models are available: One



Navy Recruit passes its physical

Vitally important nuclear part must be sound beyond question. Electric Steel Foundry Company makes sure with radiography using Kodak Industrial X-ray Film.



THIS CASTING is going to sea—as an important part of an atomic propulsion unit. Its specifications are precise and rigid. It must be flawless. To be certain that it *is* right and to have recorded evidence, Electric Steel Foundry Company radiographs the casting with a Betatron and Kodak Industrial X-ray Film.

Today's demand for sound castings calls for radiography to provide proof of quality. This assurance—that highest quality castings are being delivered by a foundry goes a long way to build sales.

If you would like to know how radiography can work profitably for you, talk it over with an x-ray dealer or write us for a Kodak Technical Representative to call.

Read what KODAK INDUSTRIAL X-RAY FILM, TYPE AA, does for you:

- ★ Speeds up radiographic examinations.
- ★ Gives increased detail visibility and easy readability at all energy ranges because of high film contrast.
- ★ Provides excellent uniformity.
- ★ Reduces the possibility of pressure desensitization under shop conditions.

EASTMAN KODAK COMPANY
X-ray Division Rochester 4, N.Y.

Kodak

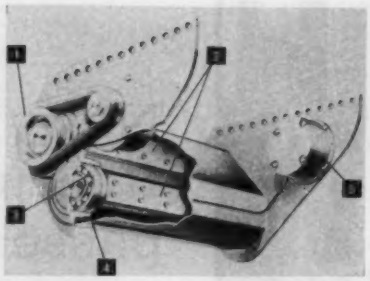
Circle 632 on Page 55

for fixed mounting in production areas and the other for portable use in laboratories. Unit can measure temperatures at distances between 20 in. and 60 ft and is claimed not to be significantly affected by smoke, dust, dirt, or size of target area.—**Instrument Development Laboratories Inc.**, a subsidiary of **Royal McBee Corp.**, 67 Mechanic St., Attleboro, Mass.

For More Details Circle No. 466—Page 55

VIBRATING FEEDERS

Vibrating feeders are designed for high capacity controlled feeding of heavy, abrasive bulk materials. A straight line feeding motion is said to be produced by the vibrator's two unbalanced shafts, driven by individual pancake motors. The shafts rotate in opposite directions and cause the motors to synchronize despite absence of direct coupling between shafts. Conveying action can be altered by changing the amount of shaft unbalance. Cutaway view shows: 1. Labyrinth seals. 2. Automatically synchronized unbalanced shafts. 3. Self-aligning spherical roller bearings. 4. Vibrator. 5. Pancake motor.—**Link-Belt Co.**, Dept. PR, Prudential Plaza, Chicago 1, Ill.



For More Details Circle No. 467—Page 55

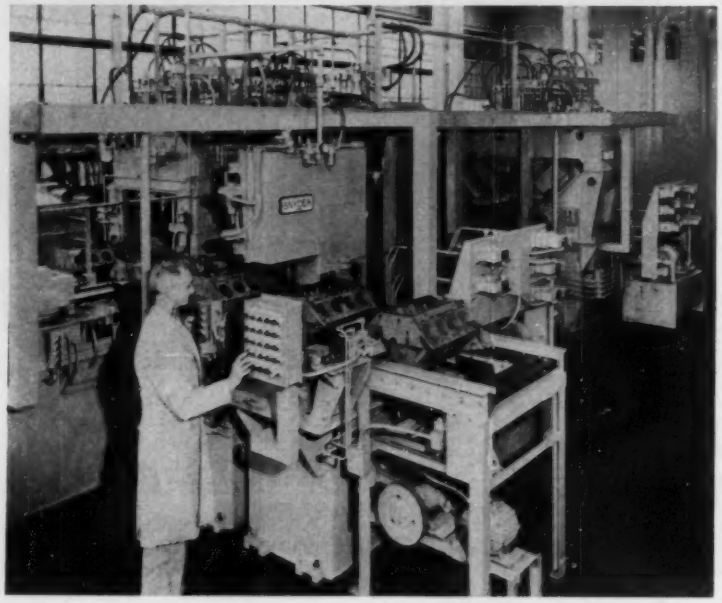
PORTABLE HEATER

Portable heater blows air around the outside of a completely enclosed combustion chamber producing heated fresh air. Fumes can be vented out the top and ducts can be provided to pipe heat to a specific area for spot heating. Model S200 ID produces 200,000 Btu of heat at a rate of 1600 cfm and

Model S420 ID produces 420,000 Btu at a rate of 4500 cfm. The latter model has a built-in room thermostat and both models have a low oil cut-off switch and an electric solenoid shut off. Automatic ignition is an additional feature.—**Stow Mfg. Co.**, 23 Shear St., Binghamton, N. Y.

For More Details Circle No. 468—Page 55

Machine Defins Iron Engine Block Castings



Transfer-type machine will defin iron automotive V-8 engine block castings at a rate of 240 per hr. Unit replaces manual labor using air hammers and applies same principles of transfer, in-process gaging, and part orientation as transfer machines used to remove metal with cutting tools. Instead of cutting tools, the machine uses round, hardened steel punches activated by air cylinders and hardened steel chipping tools fitted to standard air hammers to remove the fins from the casting.

Machine is set up in 13 stations with adequate room to allow tool removal and necessary maintenance. Air power is used throughout the machine; hydraulic power is used only to index the parts and operate the locators. The parts are slid from station to station on fixed, hardened rails, and an automatic conveyor carries chips and fins out of the machine.—**Snyder Corp.**, 3400 E. Lafayettte, Detroit 7, Mich.

For More Details Circle No. 483—Page 55

SILLIMANITE CEMENTS

Sillimanite refractory cements are available in heat-setting and air-setting types for bonding mullite, high alumina, kaolin, fireclay brick, and shapes in high-temperature furnaces. Properties of these cements are said to include improved workability in either dipping or trowelling consistency, resistance to slagging or erosion, and reportedly negligible shrinkage at high temperatures.—**Chas. Taylor Sons Co.**, 710 Burns St., Cincinnati 14, Ohio.

For More Details Circle No. 469—Page 55

LIFT TRUCK

Fork lift truck Y-3024 with 3000 lb capacity has been added to company's line of pneumatic-tired fork

JENKINS BROTHERS, *Limited* (MONTREAL PLANT)

produces shell cores on F.E.*'s fully automatic*

SHELL CORE BLOWER

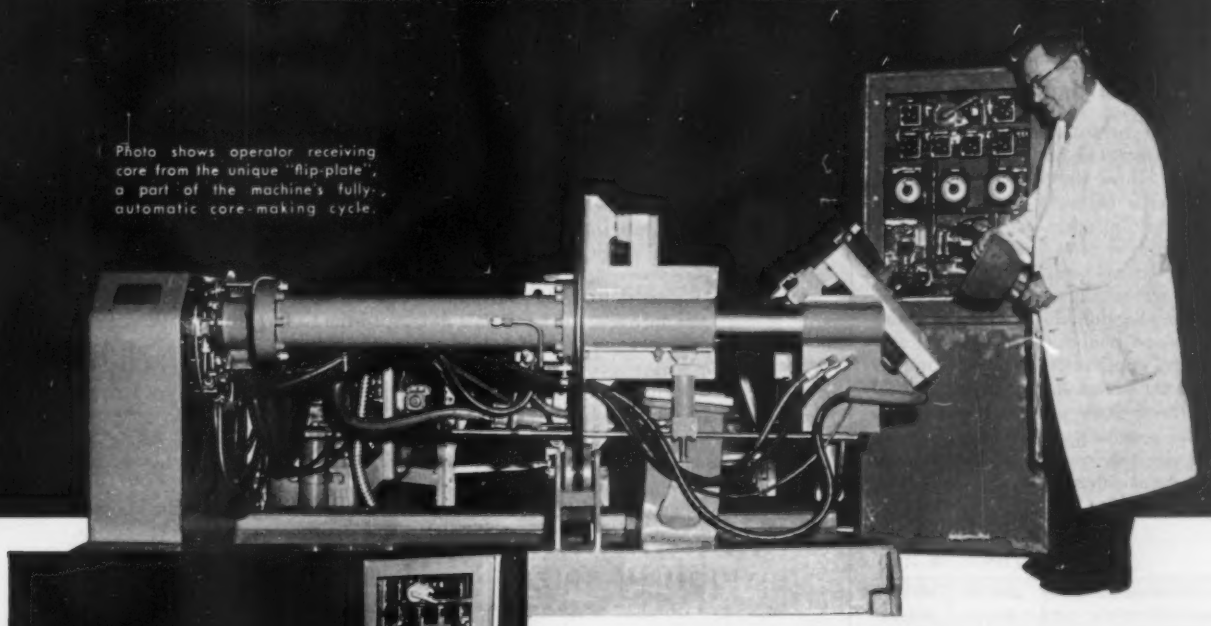
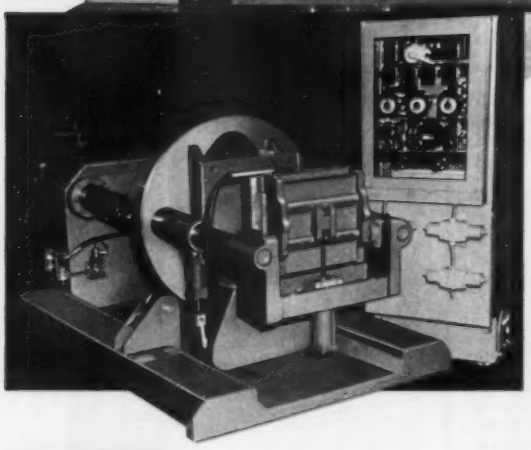


Photo shows operator receiving core from the unique "flip-plate", a part of the machine's fully-automatic core-making cycle.



F. E.'s new, streamlined Shell Core Blower uses two standard size, interchangeable heater plates — 20″x16″ for core box sizes up to 20″x17″x14″, and 20″x24″ for boxes to 20″x25″x14″.

All movements hydraulically controlled. Hydraulic unit and electric control panel self-contained, placed for convenience. Cores are ejected by means of a "flip-plate" assembly, which virtually "hands" cores to the operator. At no time does the operator have his hands between the heater plates.

F. E.'s Shell Core Blower is fast, efficient and very easy to operate. Turns out perfect shell cores — no core breakage, no core box wear. Quickly changed from fully-automatic to single cycle control. Easily set up and economical to operate.

Additional information and prices on request.

HEATER PLATES: Plug-in receptacle for easy change-over. Thermostat-control. Heavy-duty, cast-in elements.

HYDRAULIC CYLINDERS: Have case-hardened, chrome-plated rods.

POWER CONSUMPTION: 20″x16″ heater plate, 16½ KW — 20″x24″ plate, 24 KW.

AIR PRESSURE: 80-100 p.s.i. Regulator, filter, lubricator supplied.

CONTROL PANEL: Standard equipment — investment, cure, rocking timers.

SAND BOX: Adjustable to suit core box parting line. Can be supplied with automatic refill unit.

OVER-ALL BLOWER DIMENSIONS: Length 80″, width 52″, height 50″.

F. E. NORTH AMERICA, LTD.

47 ADVANCE ROAD, TORONTO 18, ONTARIO, CANADA

TELEPHONE: BELMONT 3-3227 • **TELEGRAMS:** EQUIPMENT, TORONTO

Circle 633 on Page 55

THE LITHIUM REACTOR

CURRENT INFORMATION ON LITHIUM CHEMISTRY AND METALLURGY

LITHIUM-LEAD EUTECTIC SHOWS IMPROVED MECHANICAL PROPERTIES

Small Addition of Lithium Makes Big Difference in Strength and Other Important Properties

Lithium's unusual alloying potential is demonstrated once again in lead-lithium alloys where small quantities of lithium enhance many of lead's more useful properties.

Lithium is only slightly soluble in lead and forms one practical eutectic at .69 weight per cent Li. Above one per cent Li, the alloys formed are too brittle and friable to be useful in any modern application. Several samples of the 99%-lead—1%-lithium material have been made up and tested. Some of the resulting comparative figures (see chart below) show definite improvement offered by the alloy over commercial lead.

	Pb (99.73%+)	99% Pb —1% Li
Ultimate tensile strength	2000 psi	5770 psi
Tensile yield stress	800 psi	4330 psi
Shear strength	1825 psi	3960 psi
Elongation	47%	51%
Reduction of area	100%	74%

Other investigations show the stress rupture life of the eutectic to exceed 1000 hours at room temperature and 1000 psi load. The elongation was 1.8%. Loadings of 2000 psi and over severely reduced the time factor.

The hardness of the eutectic was reported as 15.0 compared to 4.5 for unalloyed lead (diamond pyramid test).

The eutectic is somewhat susceptible to oxidization. A gain of 0.03% weight was recorded after 500 hours at 230°F. However, immersion tests over three-week periods showed no change at 70°F in water, styrene, or amyl benzene.

Contact corrosion tests with 2024T aluminum, 1010 steel, brass, and 321 stainless steel showed no attack on the contact metal after 3 weeks at normal temperature and humidity. The eutectic gained 1% weight in these tests.

The eutectic has been shown to suppress secondary gamma-ray production.

New Lithium G-3 Applicator Devised for Small Foundry Melts

Foundry Tests Prove New Applicator Superior

The successful lithium inoculation of cuprous melts requires deep submersion of the lithium cartridge. This is essential because the lithium, with a density which is but $\frac{1}{16}$ that of copper, might otherwise rise to the surface and burn without combining effectively with the gas-forming elements in the melt.

Lithium Corporation's concern with the convenience and efficiency of introducing lithium cartridges led to the development of the G-1 and G-2 multi-purpose applicators which were introduced last year. Finding widespread interest among foundrymen, these applicators are especially well-suited for inoculating large melts.

Small foundry melts, however, particularly those of 200 pounds or less, require a more delicate approach. LCA has now developed the G-3 applicator specifically designed for use in small operations.

The G-3 applicator is comprised of a two-foot-long, one-inch-diameter graphite rod. At the lower end is attached a two-inch-square, four-inch-long graphite block. The bottom face of the block is notched to receive one or more LCA lithium cartridges. The cartridges are secured in the notch by one or two wraps of copper wire. The upper end of the rod is fitted with standard pipe threads for the attachment of a handle or an ordinary pipe extension.

The G-3 applicator has been foundry tested and proved to be superior to other models in quality and workmanship. Its lesser volume of higher quality graphite reduces heat absorption and resists the tendency to burn when the rod is withdrawn from the melt.

LITHIUM IN BRIEF

Alloying and casting studies on Pb-Li eutectic also lists mechanical and corrosion properties of the alloy. (1959)

•

Mass transfer in liquid-lithium forced-convection loops studied and solution rate constants tabulated. (2499) Effects of radiation-generated helium and tritium on the properties of Al-Li and Mg-Li alloys have been reported. (2514)

•

Clinical study discounts potential toxicity of Li ion in human system. (2559)

•

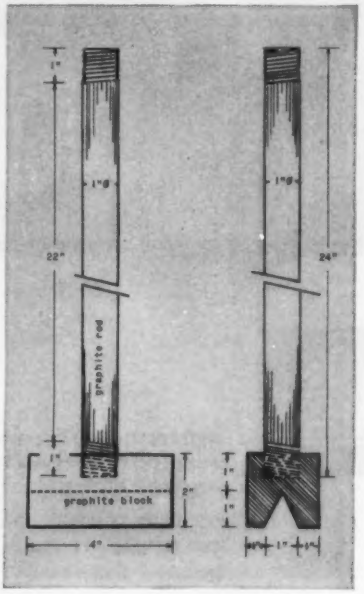
The properties of lithium ferrite monocrystals with respect to magneto crystalline anisotropy and ferromagnetic resonance are discussed in literature. (2993-2994)

•

The effect of molten metals on stressed solid metals with emphasis on the effect by lithium has been reported. (3232)

•

The structural aging effect of aluminum-copper-lithium alloys, the mechanical properties of aluminum-lithium alloys, and the theta phase in magnesium-lithium-silver alloys are discussed in recent AIME publications. (3248, 3249, 3250)



New LCA G-3 applicator

LITHIUM CORPORATION OF AMERICA, INC.
500 FIFTH AVENUE • NEW YORK 36, N. Y.
NEW YORK 36, N. Y. • CLEVELAND 14, OHIO • CHICAGO 1, ILL. • LOS ANGELES 36, CALIF. • BESSEMER CITY, N. C.

Circle 634 on Page 55

lift trucks. Entire line has been revised to include power steering, a frame made narrower by 7 in., lift speeds increased to 55 fpm, and gasoline and hydraulic tanks built integral with the frame. Other features include a 12-v electrical system, new exhaust system claimed to give quieter running, and a full instrument panel. — **Truck-Man Lift Trucks,** 558 Liberty St., Jackson, Mich.

For More Details Circle No. 470—Page 55

THERMOCOUPLE

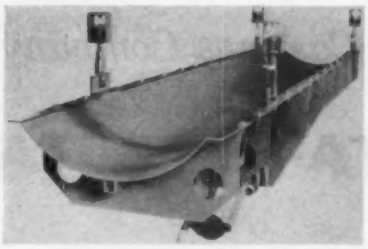
Expendable thermocouple is for measuring steel bath temperatures. Unit consists of a metal cap on the immersion end of the cartridge, a wood terminal post, and a tapered one-piece ceramic body. The cartridge fits into a receptacle which is mounted on the company's record-

er. Electrical connections between cartridge and receptacle are made by sliding pressure contact with the male terminal post on the cartridge rather than on the receptacle. The cartridge and receptacle are fully compensated to assure accuracy.— **Leeds & Northrup Co.,** 4934 Stenton Ave., Philadelphia 44, Pa.

For More Details Circle No. 471—Page 55

CONVEYOR BED

Replaceable bed has been applied to a vibrating conveyor so that it is not necessary to purchase a complete unit when the original pan becomes too worn for satisfactory service. Made of ¼-in., SAE 950 abrasion resistant steel, the bed is bolted to a reinforced steel framework and is suspended from four springs which isolate vibrations from surrounding structures. Only moving part in the unit is the air piston which is automatically lubricated by oil injected into the air



stream. Short models with similar construction are available for use as feeders. — **Cleveland Vibrator Co.,** 2828 Clinton Ave., Cleveland 13, Ohio.

For More Details Circle No. 472—Page 55

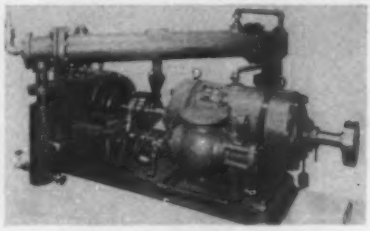
VACUUM FURNACES

Line of induction-heated vacuum furnaces now includes Model 437-519 laboratory furnace with a capacity of 3 to 8 lb; Model 437-525 with a capacity of 100 lb on a batch basis; and Model 437-524 for melting 50-lb loads during long production runs. Included with each unit are properly-sized pumping systems and built-in provision for sampling, correcting, temperature measurement, and pouring without disturbing the vacuum in the melting chamber. The units are claimed to be especially useful for investment casting.—**F. J. Stokes Corp.,** 5500 Tabor Rd., Philadelphia 20, Pa.

For More Details Circle No. 473—Page 55

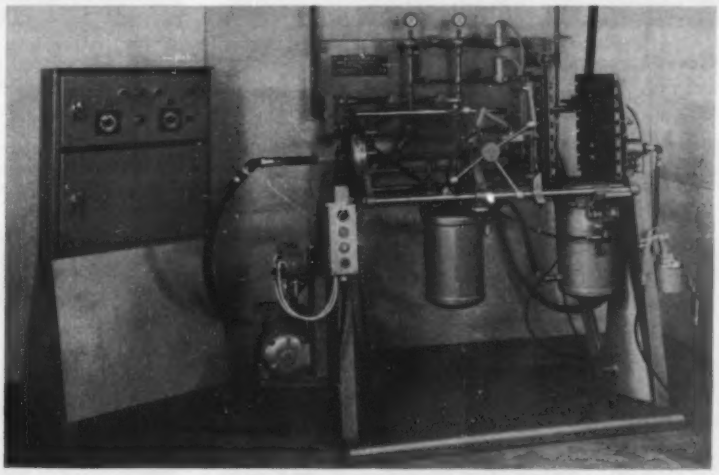
ROTARY COMPRESSORS

Preassembled rotary compressors are available featuring an overhead intercooler for compactness. The line includes two-stage models from C60-60H to C300-300H which cover capacities from 279 through 3300 cfm and discharge pressures to 125



psi. Direct connection can be made to electric and gas motors or gear-turbine drive. Each stage consists of a water-jacketed cylinder with heads. Intake and discharge open-

Shell Core Machine Is Automatic, Gas-heated



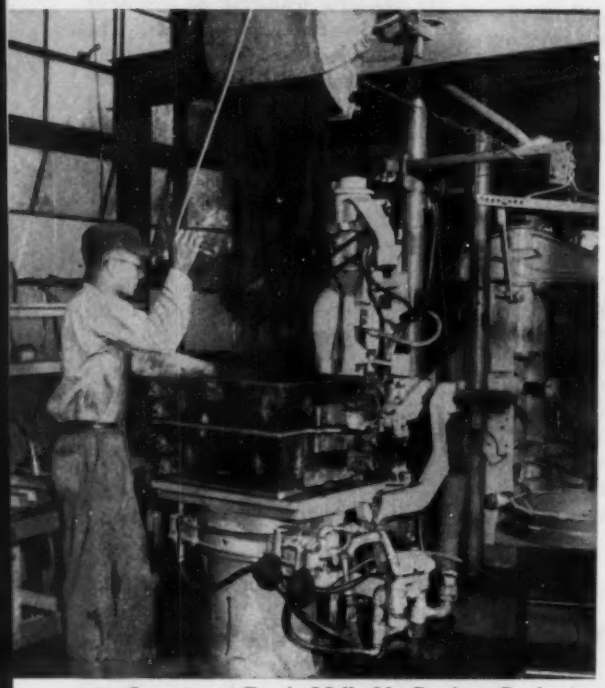
Shell core machine produces cores on a controlled cycle so that the operator has only to open and close the corebox and remove the finished cores. Unit features continuous supply of sand with adjustable drainage time so that complicated cores can be drained. Face plates are 14½ x 18 in., with additional outlets available for larger coreboxes.

Heating is applied directly against the corebox by natural, manufactured, or bottled gas thermostatically controlled. Up to 174,000 Btu per hour are provided.—**Dependable Shell Core Machines Inc.,** P. O. Box 2183, Portland 14, Oreg.

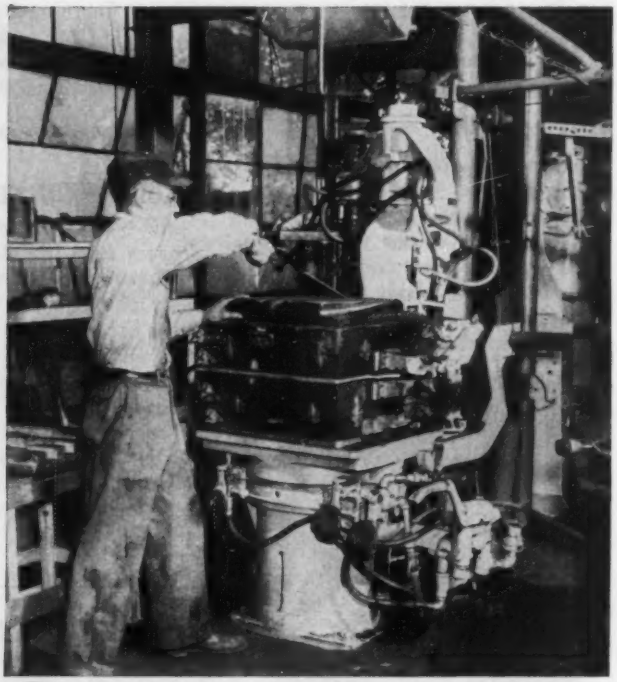
For More Details Circle No. 484—Page 55

Peoria Malleable Castings Company shows you . . .

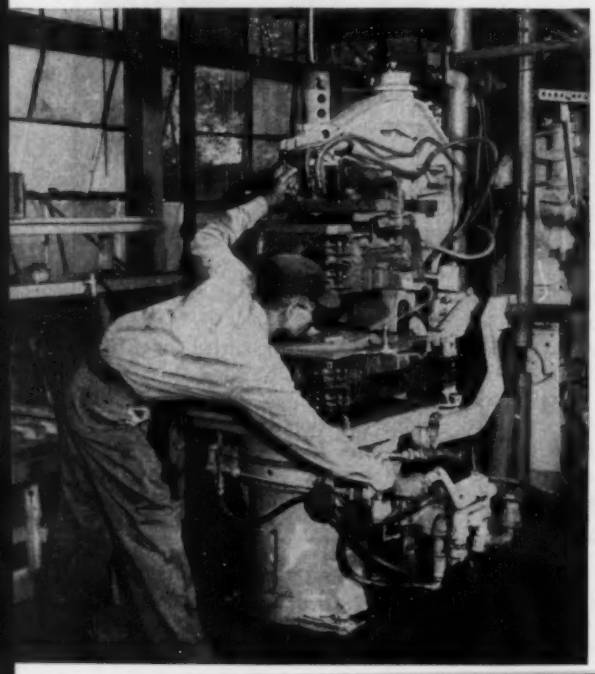
HOW ROTA-LIFT® RAMS LARGE



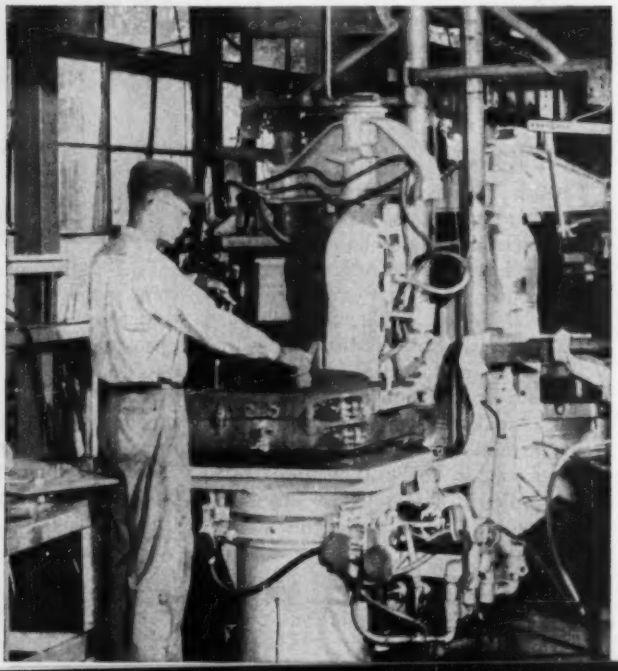
1 Operator at Peoria Malleable Castings Co. begins molding cycle with assembled flask and pattern plate on *Rota-Lift* table. Drag is filled with sand from overhead hopper.



2 After drag half has been filled and jolted, bottom board is secured and flask is ready for lift and rollover. Unit in background is another of the nine *Rota-Lift* machines used here.

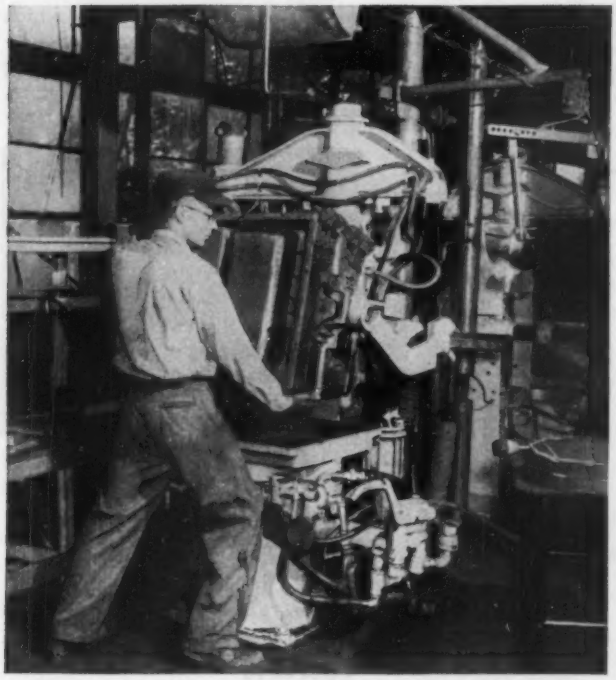


4 *Rota-Lift* squeezes cope and drag, draws and holds cope on return stroke. Pattern plate is vibrated during draw. Operator draws pattern prior to setting cores.



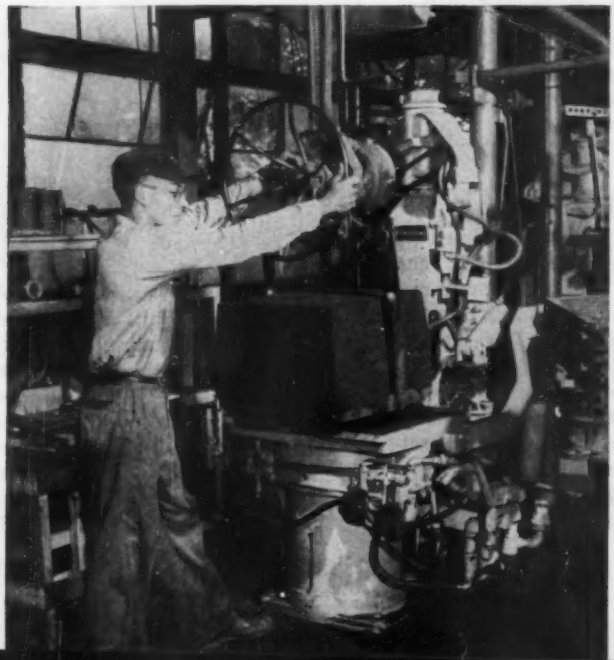
5 Cope is now swung out of the way at left. Operator sets cores, positions head of *Rota-Lift* over drag and machine closes the mold.

MOLDS FASTER AT LESS COST



3 Operator hits knee-operated valve, *Rota-Lift* arms raise flask for quick, easy rollover. Rolling action is guided with fingertips. No heavy muscle-work needed.

6 Flask is manually stripped and finished mold—ready for pouring—is lowered to floor by jib-crane. **Rota-Lift lets operator complete entire molding cycle in less than two minutes.**



Mechanized match-plate molding saves time . . . muscle . . . money . . . in this modern jobbing foundry

Like many jobbing and semi-production foundries today, Peoria Malleable Castings Company looked hard for ways to upgrade efficiency and reduce costs on short-run, match-plate molding operations.

Multiple Problem—They needed the answers to questions like these: How can we cut pattern change-over time? How can we speed mold making and handling? How can we keep up production continuity on small job-orders for our wide product range? They found the answers in Osborn *Rota-Lift* equipment.

Today, Peoria Malleable operates nine *Rota-Lift* machines at their up-to-date Peoria, Illinois plant. It's on-the-job proof that where profitable runs depend on speed and economical operation, it pays to mechanize with *Rota-Lift*.

One-Man Job—Rota-Lift easily does all five major match-plate molding operations . . . jolt . . . roll . . . squeeze . . . draw . . . close. Peoria Malleable found that a single *Rota-Lift* operator can handle the entire molding operation from fill to strip, turning out a finished mold about every two minutes. And *Rota-Lift* machines are quickly adjustable to a wide range of flask sizes for fast job change-overs.

Over-All Costs Down—Work-loss and costs due to injuries are lower, too—because *Rota-Lift* takes the "muscle" out of large match-plate molding. It handles all the heavy lifting . . . eliminates manual rollover.

If you're looking for a way to streamline your molding operations . . . improve your competitive position . . . increase your profit margin—Osborn can recommend the right model *Rota-Lift* to do the job. Write for full details. *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio. Phone ENdicott 1-1900.*

Foreign Representatives—*ARGENTINA: EISA Argentina, Buenos Aires. BELGIUM: S. A. Isbecque Todd, Brussels. BRAZIL: Equipamentos Industrias EISA, Ltd., Sao Paulo. BRITISH ISLES: J. W. Jackman & Company, Ltd., Manchester. FRANCE, ITALY: S. A. des Machines Osborn, Paris. MEXICO: Forel de Mexico, S. A., Mexico, D. F. THE NETHERLANDS: Landre & Glinderman, NV, Amsterdam. SWEDEN: S. Alexanderson & Company, A/B, Sodertalje. SWITZERLAND, FED. REP. OF GERMANY: APROTEC, S. A., Geneva. BOLIVIA: International Machinery Co., LaPaz. CHILE: International Machinery Co., Santiago. PERU: International Machinery Co., Lima.*

OSBORN®

Molding Machines • Shell Core Machines • Core Blowers • Metal Finishing Machines ...and Finishing Methods • Industrial Brushes

Circle 635 on Page 55

ings are located in a horizontal plane on opposite sides of the cylinder to avoid reversal of air flow and to simplify piping.—**Fuller Co.**, Catasauqua, Pa.

For More Details Circle No. 474—Page 55

LIFT TRUCK

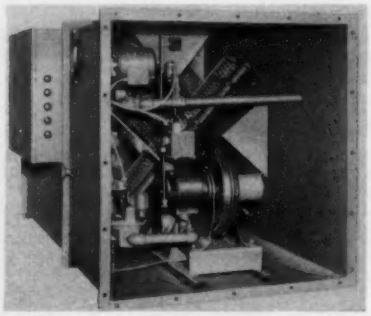
Series 4000 heavy duty fork lift is designed primarily for use outdoors. Unit is equipped with either a gasoline or a diesel engine of 172 cu in. displacement. Stacking heights of 10, 12, 16, and 21 ft are offered as well as two and three-stage masts which can be tilted hy-

draulically 6½ degrees forward and 13½ degrees backward. Other features include adjustable forks or 42 or 60-in. face plates, optional reversing transmission gear shift, and a protected cab.—**Tractor and Implement Div., Ford Motor Co.**, Birmingham, Mich.

For More Details Circle No. 475—Page 55

GAS-FIRED INTAKE UNITS

Redesigned gas-fired air intake units supply makeup air to replace that removed by exhaust systems. Four basic units give a capacity range of 15,000 through 90,000 cfm



(1 million to 7 million Btu/hr). Basic units include the burner, controls, and belt or direct driven fan in a single housing. Controls systems can be supplied to meet operational, local code, and insurance agency requirements. — **Hartzell Propeller Fan Co.**, Piqua, Ohio.

For More Details Circle No. 476—Page 55

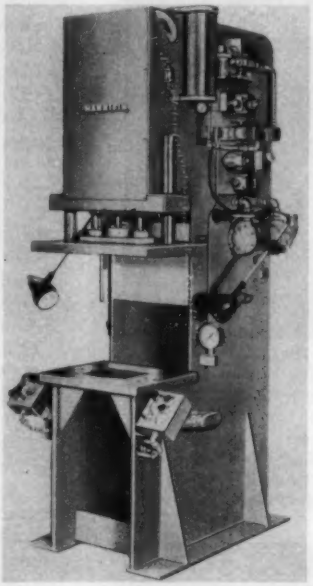
MOLYBDENUM DISULFIDE

Concentrated dispersion of colloidal molybdenum disulfide in isopropyl alcohol, called dag 210, forms an adherent film applicable to a variety of substrate materials with minimum surface pretreatment. It can be applied with spray, brush, dip, or swab. The resultant film exhibits the lubricating and release properties inherent with molybdenum disulfide. The dispersion is claimed to resist settling, insuring stability and maximum shelf life.—**Acheson Colloids Co.**, Port Huron, Mich.

For More Details Circle No. 477—Page 55

TRIMMING PRESS

Trimming press is claimed to trim diecast parts at high speeds. Wheels can be mounted on this hydraulic



press to provide mobility and ease of use.—**Hannifin Co.**, Dept 238, Des Plaines, Ill.

For More Details Circle No. 478—Page 55

FLUORESCENT LAMP

Fluorescent lamp is claimed to provide 15 per cent more light than standard 40-w cool white lamps and 36 per cent more than daylight lamps. It produces 3200 lumens compared to 2800 for ordinary 40-watt fluorescent lamps. Improved performance is said to be due to special phosphor combination coating. Lamp is suitable for all uses where high light output at low cost is more important than critical color rendition. Made in the universal preheat, rapid-start design, the 40-watt lamp fits all present fixtures and ballasts.—**Westinghouse Electric Corp.**, Box 2278, Pittsburgh 30, Pa.

For More Details Circle No. 479—Page 55

INSULATED HOIST LINKS

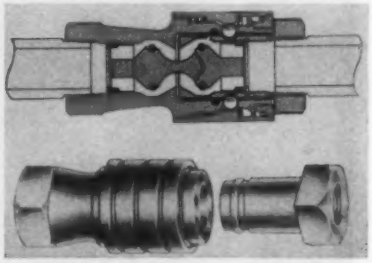
Links are designed to insulate electric hoisting equipment which otherwise might be burned out by current flowing from a part being welded while supported by the hoist. Steel inserts separated with lami-

nated insulating cores are wound with glass fiber roving and bonded together with epoxy resin. Low-voltage insulated links are produced in sizes ½ to 5-ton and rated at 1 kv. —**E. D. Bullard Co.**, Sausalito, Calif.

For More Details Circle No. 480—Page 55

COUPLING

Double shut-off quick coupling, Series G, has a two-way check valve that stops the flow from both lines with minimum fluid loss when making or breaking the connection. Simply pushing together the two ends to be coupled is said to form



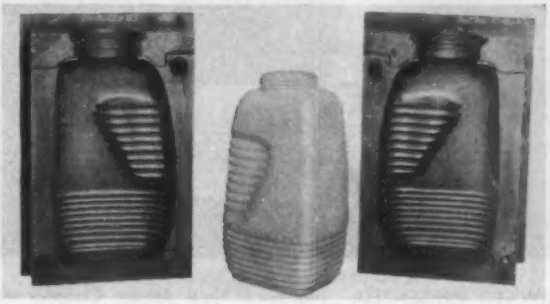
a positive high pressure leakproof connection. Swivel action is claimed to prevent hose tangling and kinking. Unit is made in steel or brass in ¼, ⅜, ½, and ¾ in. NPT pipe sizes to withstand working pressures up to 8000 psi.—**Breco Div., Perfecting Service Co.**, 332 Atando Ave., Charlotte 6, N. C.

For More Details Circle No. 481—Page 55

BERYLCO Beryllium Copper Alloys Do the Extra Special Casting Jobs Without Extra Handling

High hardness, high strength, excellent thermal conductivity, good corrosion resistance, wear resistance and castability, as any foundryman knows, make an outstanding combination of performance properties for castings. They're all found in BERYLCO beryllium copper alloys, and they add up to easy handling, whether the job is a blow mold, casting die or any type of casting. In addition to the performance extras, fluidity is excellent, intricate detail is obtainable in "as cast" parts and pouring temperature is low. BERYLCO alloys have distinct advantages over ferrous and non-ferrous materials with similar properties.

Our foundry specialists can supply any assistance you may need. They'll be happy to send or bring you details on the use of beryllium copper.



Beryllium Copper Blow Mold—Photograph Courtesy Standard Tool Co.

BERYLCO®

THE BERYLLIUM CORPORATION

Reading, Pennsylvania

Circle 636 on Page 55

Industry Briefs

Despatch Oven Co., Minneapolis, Minn., has named H. R. Davies Sales & Engineering Co., New Orleans, La., as industrial representative to service the lower Mississippi and Louisiana area.

Universal-Rundle Corp. has closed its Milwaukee plant and transferred all production to Camden, N. J. The company states that improvements at the Camden plant increased capacity to more than the previous output of both the Milwaukee and New Jersey plants.

Crucible Steel Co. of America, Pittsburgh, has acquired 75 per cent ownership of the Fonderie Acciaierie Milanesi Vanzetti, S. p. A., producer of specialty steels and castings. Vanzetti will continue to operate with its present management and employees as Acciaierie Crucible Vanzetti, S. p. A. Ground has been broken for a new plant, to be completed late in 1961, which will double current capacity.

Electric Steel Foundry Co., Portland, Oregon, has changed its name to Esco Corp. The change was made because of the firm's expansion into fields other than the foundry industry.

Scott Castings Corp., Buffalo, plans a $50,000 office addition to its plant. The company specializes in nickel and Monel castings.

Industrial Heating Equipment Association Inc. reports that new orders for industrial heating equipment in August totaled $7,840,000, up 97 per cent from July orders of $3,966,000. August orders for induction heating equipment were $1,047,000, or 62 per cent ahead of July.

Detroit Electric Furnace Div., Kuhlman Electric Co., Birmingham, Mich., has completed a license arrangement with Forni Elettrometallurgici Co. of Italy to manufacture and sell 60-cycle induction furnaces in North and Central America. The new line, including both core and coreless-type furnaces, will be sold in addition to Detroit Electric's present line of indirect arc furnaces.

Foundry Facings Manufacturers Association has moved its headquarters office to 900 N. Federal Highway, Pompano Beach, Fla. C. E. Herington is secretary-treasurer.

Kelsey-Hayes Co., Detroit, will acquire Gunite Foundries Corp., Rockford, Ill. The agreement is subject to approval of the board of directors of both companies.

Kaiser Aluminum Chemical Sales Inc., Oakland, Calif., has appointed Consumers Metal Corp., 7777 W. Chicago, Detroit, to distribute its aluminum ingot products in the Detroit area.

Albion Malleable Iron Co., Albion, Mich., is nearing completion of a $90,000 plant to house machining and finishing equipment. It is on the corner of North Albion and Chesnut Streets, Albion.

Baird - Atomic Inc., Cambridge, Mass., has opened an office in Cleveland. This office, under the supervision of Alexander V. Evans, will handle the sale and servicing of Baird's atomic instrumentation.

Asbury Graphite Mills Inc., Asbury, N. J., has acquired all of the outstanding stock of **Cummings-Moore Graphite Co.**, Detroit, grinder and refiner of Mexican and other graphites, and all of the outstand-

AWARD PRESENTED: Northern New Jersey Chapter of the Society for the Advancement of Management awarded the Professional Managers Citation to Frank G. Atkinson (center), president, Joseph Dixon Crucible Co., Jersey City, N. J., for contributions to the cause of management and civic affairs. Making the presentation are (left and right) Philip Carroll, professional engineer, and James Newsome, production manager, Johnson & Johnson Co., Chicago. Mr. Newsome is national president of the society and Mr. Carroll a past president

MECHANI-MIZE*
FOUNDRY-WISE
WITH
NATIONAL
UTILITY UNIT
*Meaning . . . now it's easy and economical to get your sand up off the floor without major plant changes or big equipment costs.
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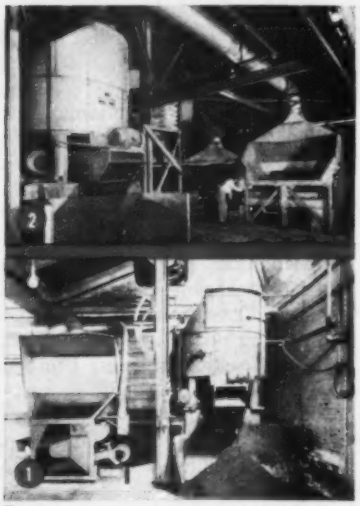
Planned, Progressive Mechanization grows with you . . . costs you less



1. *Here's a start.* Mix-Muller, Loader, Screen-Master and exhausted hopper. Note magnetic separator.
2. *A step further.* Heavy duty shakeout screen is added.
3. *Next step . . .* elevator replaces loader and conveying equipment is added—still without major plant change or extensive pit or overhead work.

Here's an expandable sand conditioning and handling unit designed to increase your output at welcome savings in time and labor . . . without major expansion, plant change or big investment in mechanization.

If you have a Mix-Muller, you have a start! The simple addition of a National Screen-Master, Bucket Loader and Aerator can turn your mixing operation into a conditioning plant. A front end loader will get your sand up off the floor. As your mechanization needs grow, you'll find that National has the equipment and the know-how to help you grow efficiently, economically—to a predetermined Foundry-wise plan.

Why not let your NATIONAL representative show you, by your own records, how a National Utility Unit can pay its own way in as little as two years time?

WRITE FOR LITERATURE

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HOW To Do It

FOUNDRY will pay a minimum of $15 for each "How To Do It" idea submitted and published

Chemical Coloring Compound Controls Core and Mold Quality in CO_2 Process

By TOHRU TAKI
Kubota Iron & Machinery Works Ltd.
Chuko Plant, Osaka, Japan

COLOR can be used as a production and quality control in the sodium silicate, CO_2 molding and coremaking process. The color is achieved by adding phenol-phthalein powder to the sodium silicate-sand mix. The proportion is as follows: Silica sand, 441 lb (200 kg); sodium silicate, 17.6 lb (8 kg), and phenol-phthalein, 2/3 teaspoon dissolved in half cup of hot water.

That mixture is pink, but when molds or cores are rammed and gassed properly the color almost vanishes. Thus gassing time can be determined and overgassing avoided with resultant improved core quality. Furthermore, if a core absorbs moisture between the time it is gassed and the time it is put in the mold the sand will turn pink again. The change in color is a warning that the core is moist and may cause trouble in the mold.

ing stock of the latter's subsidiary, **Grafitera de Sonora, S. A. de C. V.**, Sonora, Mexico, leading miner of natural amorphous graphite. Both companies will continue as independent units under their present management.

Reynolds Metals Co. now is producing silicon metal at its Sheffield, Ala., plant. The new electric furnace at this plant has a 5000-ton rated annual capacity of silicon metal. Most of the silicon will be used to meet foundry industry demands for silicon-aluminum alloys.

Dis-Die Steels Inc., Warren, Mich., has moved to a new location at 25133 Flanders Rd., Warren. The firm specializes in pretempered and hot work steels for diecasting and extrusion tools.

Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp., has a new technical center at Mexico, Mo., to house research and technical personnel. The center will be equipped to test and evaluate material of all types in the development of fire clay, silica, and high-alumina refractories. The building also will serve as headquarters for the division's raw materials department.

Bucyrus-Erie Co., South Milwaukee, Wis., will permanently close its steel foundry division in Erie, Pa., and transfer operations to another foundry near its home office in South Milwaukee. It will continue, however, to make iron castings in Erie and also will keep in operation a finishing shop comprised of machining, plate, weld, and assembly areas.

Sunbeam Equipment Corp., Meadville, Pa., has appointed L. W. Lefort Co., 2335 E. 52nd St., Los Angeles, Calif., to be representatives for the Sunbeam line of industrial furnaces and equipment in southern California.

Precision Foundries Inc., Denver, Colo., has filed articles of incorporation listing $49,500 authorized capitalization to engage in a general manufacturing business. Incorporators are H. M. Schermerhorn, L. Becker, and Loretta Boggess.

National Crucible Co., Philadelphia, has begun construction of a new crucible manufacturing building. The new structure will add about 50 per cent more floor space to the present area.

Apex Smelting Co. has completed a 27,000-sq-ft addition to its Chicago plant. The new material handling building enables Apex to utilize automated methods to handle aluminum scrap and to process it for the production of aluminum alloys.

S. A. Pises Speciaux at Monoblocs Plastiques, Belgium, will sell and distribute refractory products manufactured by Ramtite Co., Chicago, in Belgium, Luxemburg, Netherlands, France, Germany, United Kingdom, Italy, and Spain. The agreement also provides for assistance on engineered applications and other technical matters, and sets up a license arrangement for manufacturing certain Ramtite refractories in Europe.

Book Review

Physical and Engineering Properties of Cast Iron **by Harold T. Angus, hard cover, 528 pages, 9½ x 7 in., published by the British Cast Iron Research Association, Birmingham, England. Price, $11.**

This handbook contains information on the behavior and properties of cast iron to be used by the engineer and designer.

The book is divided into nine parts: Constitution and structure; mechanical, physical, and electrical properties; general properties of commercial cast irons; special properties affecting surface; heat treatment; internal casting stresses; components with high local loadings; cast iron beams, columns, pipes, cylinders, and pressure vessels; and application of specifications and data to design are among the areas which are covered.

The text is illustrated with nearly 150 plates, diagrams, and graphs, and supporting data are presented in tabular form. A selection of references to original and standard works is included.

Can you store cores in stacks like this?

You can if they're *shell cores.*

That's only *one* of the bonus features shell coring gave Buffalo Pipe and Foundry Company. Others:

Fourteen men turn out 4,000 soil pipe fittings daily . . . in 225 different designs. Previously it would have required fifty men to produce the same quantity. These castings are better, too. Weight can be controlled better. Harder, smoother core surfaces give the fittings a better internal surface. There's less scrap.

Much of the credit goes to Milton Emery, the foundry's production manager, who could see the real advantages of shell cores. Working closely with the Durez technical staff, Mr. Emery was able to perfect his process, using a Durez liquid resin.

If you'd like to enjoy the many advantages of shell cores, get in touch with Durez at 8908 Walck Road, North Tonawanda, N. Y.

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION, 1011 WALCK RD., NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

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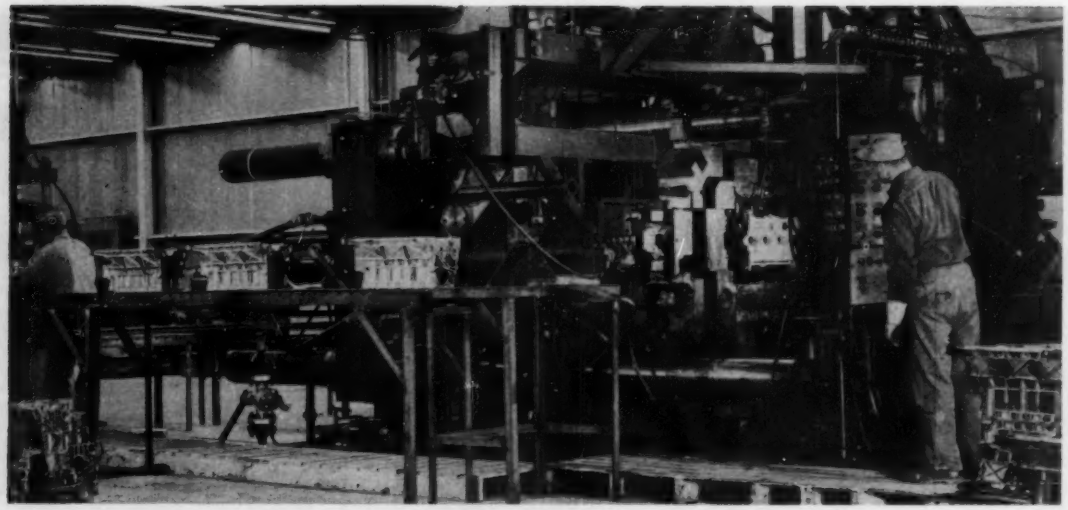


One of the diecasting machines used by Doehler-Jarvis to turn out diecast aluminum 6-cylinder engine blocks. These machines are rated at 2000-ton locking pressure

Rambler Six Will Use

DIECAST ALUMINUM BLOCK

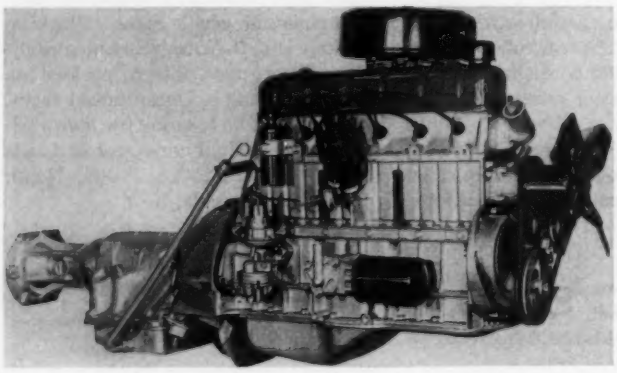
● DIECAST ENGINE BLOCKS are being used for the first time in American passenger cars by American Motors Corp. in its 1961 Rambler Classic Six automobiles.

The aluminum diecasting is produced for American Motors by Doehler-Jarvis Div., National Lead Co., Toledo, Ohio. The six-cylinder, in-line engine block develops 127 hp and weighs 67 lb. Gray iron liners for the cylinders make up 14 lb of this total, the remainder being the aluminum diecasting. The new engine weighs 80 lb less than the comparable cast iron engine used in 1960 models.

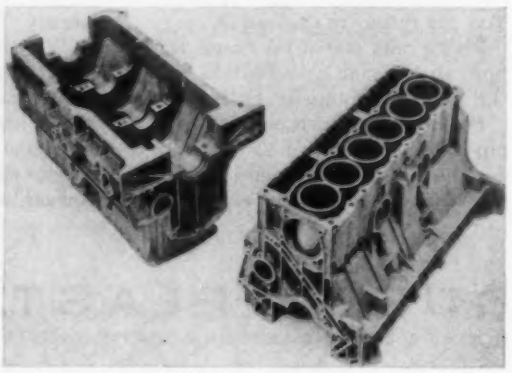
2000-Ton Machine — Diecasting machines for this job are rated at 2000 tons and were built by Doehler-Jarvis. One shot requires 65 lb of molten aluminum-silicon alloy, which is ladled into the hot sleeve automatically and is injected into the die in 0.3 seconds under a pressure of 8000 psi. Mechanical locks are used for the large side cores of the die.

The cast iron liners are produced by centrifugal casting and are

This engine, to be used in 1961 models, weighs 80 lb less than the comparable cast iron engine used last year. Block weighs only 67 lb



Two views of the first diecast aluminum block used in an American passenger car. Top section of the engine, at right, shows cast-in gray iron liners



With Mogul you can see the difference!

For years, experienced foundrymen have looked to Mogul Cereal Binder to help them consistently turn out top-quality cores. First choice in cereal binders, Mogul gives perfect green bond, offers unusual dependability in spite of usual wide variations in mulling time, types of sand, core shapes and sizes. Mogul provides high green strength; cores hold their shape during handling and storage. They give good collapsibility and easy shake-out, cutting down on strains and hot tears. The excellent permeability of Mogul reduces costly blows due to inadequate venting.

Today, teamed up with Dexocor the *dry* replacement for core oil, Mogul performs better than ever. For outstanding performance on green bond, green sand, for better blowing, easy ramming, easy shake-out, all-around improved handling and more efficient production, the combination of Mogul and Dexocor is unbeatable.

Your Corn Products technical representative is completely versed in the application of these and other binders and dextrines to mold and core making. Backed by years of experience, a completely equipped foundry laboratory, and the extensive facilities of the world's largest corn processor, our technical representatives will be pleased to work with you to help develop the combination of binders that's right for your needs. Call our nearest sales office or write direct.

MOGUL® cereal binder

DEXOCOR® is the perfect teammate for MOGUL® and KORDEK® binders and GLOBE® dextrines

CORN PRODUCTS COMPANY INDUSTRIAL DIVISION • 10 East 56 Street, New York 22, N. Y.

Circle 640 on Page 55

EFFICIENT REMOVAL OF DUST AND CHIPS

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and similar operations

Whatever your problem in industrial dust control, call on Kirk & Blum, an organization of engineers and mechanics with more than 50 years' experience in this specialized field.

You secure a complete service from Kirk & Blum . . . DESIGN, FABRICATION and INSTALLATION . . . with a single responsibility for an *efficient* dust control system.

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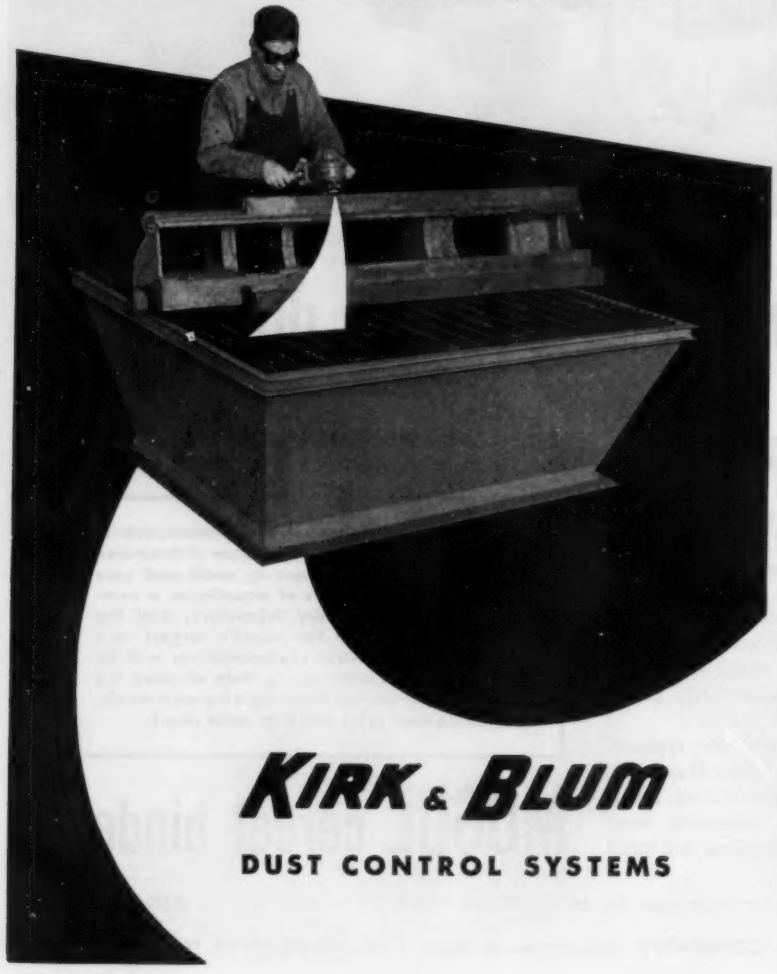

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DUST CONTROL SYSTEMS

mechanically bonded to the aluminum by a bimetallic interlock bond recently developed by Doehler-Jarvis. Cast-in iron liners afford better wear characteristics than unprotected cylinder bores of engine block castings made of hypereutectic aluminum alloys.

High Hardness—The centrifugally cast liners show Brinell hardnesses between 230 and 260. The high hardness and cooler cylinder wall temperatures of the aluminum block are said to reduce wear in the cylinder bores and increase life of the blocks.

Bores Are Loose Pieces—An interesting feature is the use of loose pieces to cast the camshaft bores, although loose pieces ordinarily are considered undesirable in diecasting because they slow down the rate of production. To overcome this handicap, the diecasting machines for the engine block have been equipped with a loading and unloading device which puts loose pieces and cylinder liners into the die automatically.

Electric Furnace Conference To Be Held in Chicago

Eighteenth annual Electric Furnace Conference sponsored by the Electric Furnace Committee of the Metallurgical Society, American Institute of Mining, Metallurgical and Petroleum Engineers, will be held Nov. 30 to Dec. 2 at the Morrison Hotel, Chicago.

Tentative program which follows includes nine technical sessions on practices in production of steel and other electric furnace products:

Wednesday, Nov. 30

8:30 a.m.—**Registration**
9:30 a.m.—**Opening Session**
9:45 a.m.—**Joint Technical Session**
"Nonmetallic Inclusions in Steel"
2:00 p.m.—**Combined Technical Session**
"Ingot and Special Arc. Factors in Improving Steel Quality, Ferroalloy Quality, and Standardization vs Steel Quality"
2:00 p.m.—**Castings Technical Session**
"Control of Nonmetallics in Steel for Castings"

Thursday, Dec. 1

9:30 a.m.—**Ingot Technical Session**
"Some Developments in Steelmaking Processes"
9:30 a.m.—**Castings Technical Session**
"Refining Metal in Air Induction Melting"
9:30 a.m.—**Special Arc Technical Session**
"Manufacture of Carbide and Phosphorus"
2:00 p.m.—**Ingot Technical Session**
"Stainless Steel"
2:00 p.m.—**Castings Technical Session**
"New Developments"
2:00 p.m.—**Special Arc Technical Session**
"Manufacture of Ferroalloys"
6:30 p.m.—**Reception and Cocktail Party**
7:00 p.m.—**Annual Fellowship Dinner**
Speaker—Charles J. Hunter, U. S. Steel Corp., Chicago

Friday, Dec. 2

Plant trips to South Works of U. S. Steel Corp., or Lemont Mfg. Co., Lemont, Ill.

AS SEEN AT THE FOUNDRY SHOW:

MIXALL gives up to 6,000 lbs. of Coated Sand per hour—at lower costs than ever before!

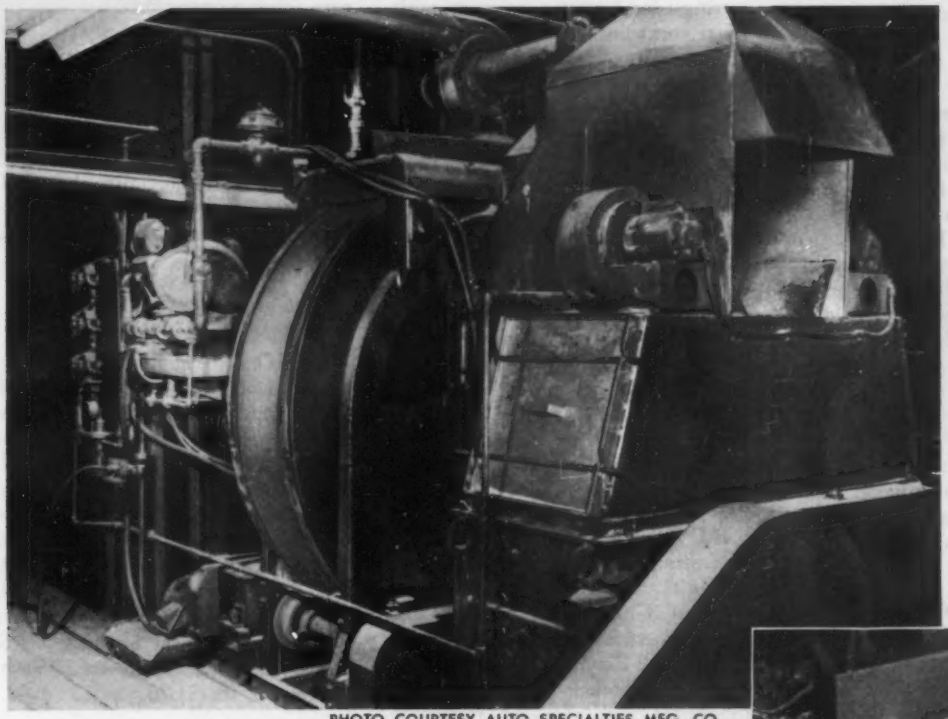


PHOTO COURTESY AUTO SPECIALTIES MFG. CO.

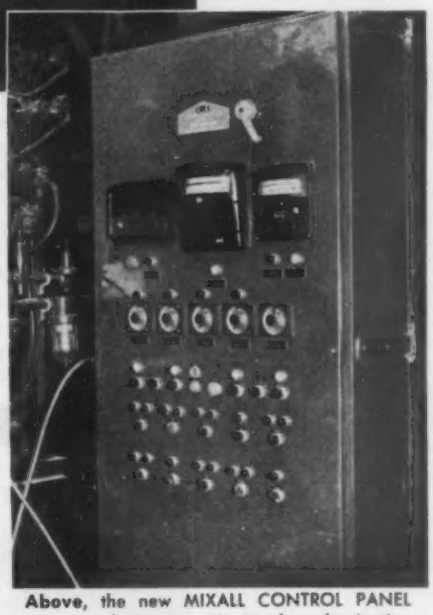
At left, the new Model 890 MIXALL in operation at Auto Specialties Mfg. Co., St. Joseph, Michigan.

Other models from 3000 lbs. per hour up to 20,000 lbs. per hour available.

The many foundrymen who saw the MIXALL at the recent show in Philadelphia were impressed by its ability to deliver greater batch capacity while keeping production costs down. This is accomplished by a rapid operating cycle: charging, heating, mixing, and discharging are completed in just 5 minutes. Simultaneous heating and mixing are possible because both cycles are independently controlled. To meet today's growing competition, this kind of practical mechanization is often the solution. Perhaps your organization can profit from the many advantages offered by the MIXALL. Our experienced engineers will be happy to discuss your foundry problems and put you on the road to practical mechanization at the lowest cost possible. Write, call or wire.

"Constant Quality through Constant Control"

Write today for Bulletin CS-806



Above, the new MIXALL CONTROL PANEL puts complete automation and mechanization at your fingertips. Controls are conveniently located, easy to read and understand.

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Foundry Developments

By EDWIN BREMER

Metallurgical Editor

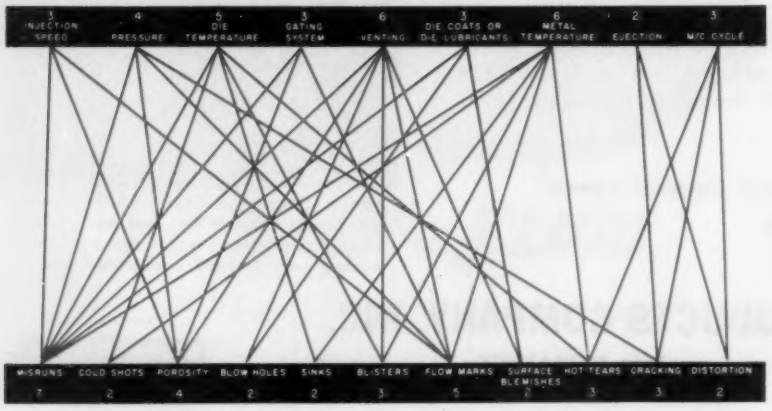
Add Glycol to Sand

APPLICATION of glycol additions to molding sand in production of magnesium-base alloy castings has been practiced for some time, but a recent study indicates that they are just as effective with copper-base alloys. As described in "Molding Sands With Addition of Glycols, Particularly for Copper-base Alloy Castings," an article by E. Brunhuber and W. Buechen in the June 30 issue of *Giesserei* (Dusseldorf, Germany), either ethyl or diethyl glycol additions to molding sand prevent metal-mold reactions and reduce the roughness of the sand surface so that smooth castings are produced. Sands used were synthetic type with 3 to 4 per cent bentonite by weight, 2 per cent water, and 1 per cent glycol. Addition of 3 per cent seacoal also was used with good results.

Shows Relationship

SIMPLE nomogram prepared by D. J. Saven and published in the Aug. 18 issue of *Foundry Trade Journal* (London, England) relates common faults in diecastings responsible for rejection, and their causes. The base indicates 11 main defects from which lines lead to the factors which contribute to their occurrence.

The nomogram may be used as a guide to separate the variables into different categories and to pinpoint the basic factors causing a certain type of defect. Contributing factors spotlight the possibilities of the rate of severity of a particular fault occurring—for instance, misruns with seven contributing factors are more likely to occur than cold shuts which have only two.



It's Cold Outside

SEVERAL techniques for evaluating the mechanical properties of materials at temperatures ranging from minus 423 to minus 452° F are described in "Notes on Mechanical Testing Techniques at Very Low Temperatures," designated PB 161193. It can be obtained from the Office of Technical Services, U. S. Department of Commerce, Washington 25, for 50 cents.

Resists Abrasion

IMPROVED abrasion resistance in castings is reported for two new austenitic manganese steels developed by Climax Molybdenum Co. Div., American Metal Climax Inc. One is a 12-2 manganese-molybdenum alloy which is said to combine toughness and abrasion resistance with a high degree of ductility. The other is a 6-1 manganese-molybdenum alloy reported to have exceptional abrasion resistance with only moderate ductility. Additionally, the incorporation of molybdenum is indicated to cause the carbides in the grain boundaries to form globules and permit use of up to 1.7 per cent carbon in commercial castings. Climax has found the new steels particularly valuable in its own mining operations, the 12-2 alloy being used successfully in slush scrapers and cone liners, and the 6-1 alloy showing promise in grinding mill liners and scoop lips, screen decks, grates and jaw crusher liners. The firm does not plan to market the steels commercially, but will make its research and development information available to interested firms.

Fast Work

RAPID heating tests lasting only a few seconds have been developed to provide short-time, high-temperature tensile and creep data for metals used in supersonic aircraft and missiles. Details are presented in report PB 151078, "Methods of Conducting Short-time Tensile, Creep, and Creep-rupture Tests Under Conditions of Rapid Heating," which is available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, for $1.25.

Spheroidizes Phosphorus

SIMPLE casting and heat treatment technique has been devised for producing nodular graphite cast iron with up to at least 1.5 per cent phosphorus in the form of spheroidal globules of phosphide, according to the article, "Spheroidized Phosphides Improve Mechanical Properties of Nodular Iron Containing Phosphorus up to 1.5 Per Cent," by Else, Bassett and Palmer in the July issue of *BCIRA Journal* (Birmingham, England).

Iron is chilled intensely by magnesium-cerium treatment, preferably with tellurium (0.05 per cent), and casting in a metal mold, followed by full graphitizing heat treatment under controlled conditions. The product has high strength similar to that of low-phosphorus nodular iron and useful ductility. However, it is brittle in the impact test at room temperature unless the phosphorus content is below 0.2 per cent.

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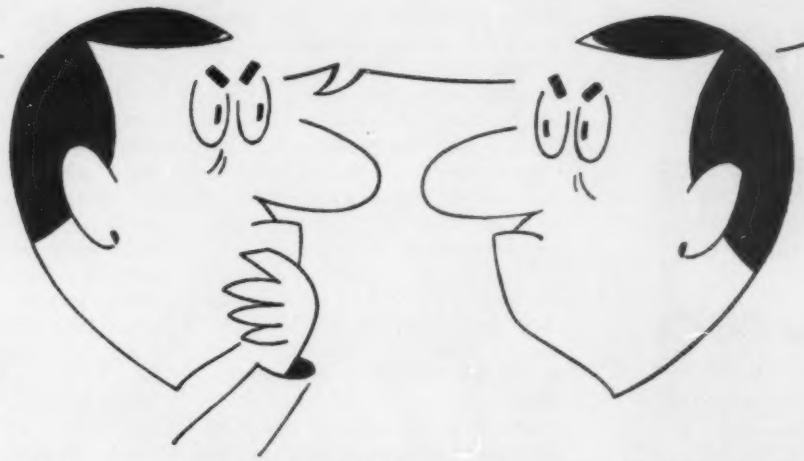

It doesn't happen every day in the week, but every now and then we get a call for help. Some core man asks himself the above question, gets a negative answer, decides to investigate and calls us for our recommendations.

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We've been in this core oil business now for many, many years and know the answers to core oil problems. For the same length of time, we've been making the finest quality oils — and selling them, you'll be glad to learn, at surprisingly low prices.

So, whenever you're in the mood to question the efficiency and economy of your present core oils — please remember that W·G·S has helped others and just might be able to help *you,* too!

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Circle 642 on Page 55

GORDON C. CURRY
President

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E. V. BLACKMUN
Doehler Award Winner

By JACK C. MISKE
Associate Editor

American Die Casting Institute Sees RECORD YEAR IN 1961

● DIECASTING OUTPUT in 1960 will register only slight gains over 1959, but may surpass the 1955 all-time high in 1961, according to members of the American Die Casting Institute, who met in Chicago, Sept. 14-15. Nearly 400 guests and representatives of the 121 member plants of the national association of job-shop diecasters attended the annual meeting.

The group expects a strong fourth-quarter which may enable zinc and aluminum diecasting totals for 1960 to exceed 1959 levels by 10,000 and 6000 tons, respectively.

The 1960 estimate is based on anticipated substantial gains in passenger car and appliance production during the last quarter. In 1961, production of 6 million passenger cars would bring zinc diecasting totals to about the same level as in 1955, when nearly 8 million cars were built, but with fewer zinc diecasting components. In addition, increasing adoption of diecast aluminum components for brake drums, wheels, and engine blocks should mean a new high in aluminum diecasting production. Magnesium diecastings also are finding greater acceptance in the automotive industry.

Varied Program — The two-day sessions opened with a half-day devoted to the group's business meeting, at which various reports were presented and plans made for future activities to widen the area of jobbing diecasting service to industry.

After the annual ADCI luncheon, a number of speakers were heard. Dr. S. F. Radtke, director of research, American Zinc Institute, discussed results of AZI research on the use of zinc alloying agents and on the attainment of better properties and finishes on zinc-base diecastings. This work is designed to determine better zinc alloys with 5 to 18 per cent Al which still can be hot chamber diecast and to provide data on zinc-base ternary alloys with 8 to 14 per cent Al and a number of other elements such as copper, magnesium, cobalt, nickel, vanadium, and others. Best results so far have been obtained with an 8 per cent Al, 0.5 per cent Cu alloy which provides improved fluidity, better properties, and easier plating.

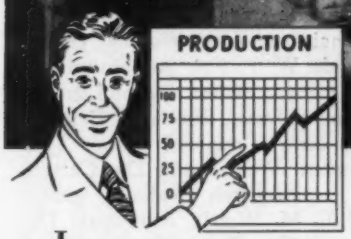
M. R. Caldwell, Doehler-Jarvis Div., National Lead Co., spoke on "Improved Plating Methods for Zinc Die Castings," the best of which are the duplex nickel and duplex chrome processes. The nickel process is the more important and is used on outdoor automotive and marine parts.

David Laine, ADCI secretary, E. V. Blackmun, Aluminum Co. of America, and F. C. Bennett, Dow Metal Products Co., made reports on the recent Third International Die Casting Conference, in Italy. Mr. Laine remarked that of the 384 delegates from 20 countries, 68 were from the U. S. Only the West German group was larger. He described the proceedings of the meeting, which was well organized and presented, and noted that diecasting is making rapid gains in Europe.

Mr. Blackmun gave brief resumes of conference technical papers, which included three by ADCI representatives, and Mr. Bennett described impressions gathered by ADCI delegates during visits to European diecasting plants (for a similar article, see p. 106, FOUNDRY, October, 1960).

Members of the institute's marketing committee combined forces

INCREASE FOUNDRY OUTPUT
WITH EFFICIENT TRAMRAIL HANDLING



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In many instances the installation of Cleveland Tramrail cranes, bridges, carriers, hoists, etc. have so cut handling time, speeded production and brought about other advantages, that 25% to 100% greater output is obtained with the same floor area.

Cleveland Tramrail is adaptable to all size and type foundries, and just as great relative savings can be made by a 10-man foundry as one employing 1000. The equipment is available for hand or electric operation, or various combinations thereof, to best serve the requirements.

Why not get the facts on the modern overhead Tramrail way of foundry handling? Learn first hand what it has done for hundreds of other foundries. This might well lead to an entirely new and profitable future course for your company.

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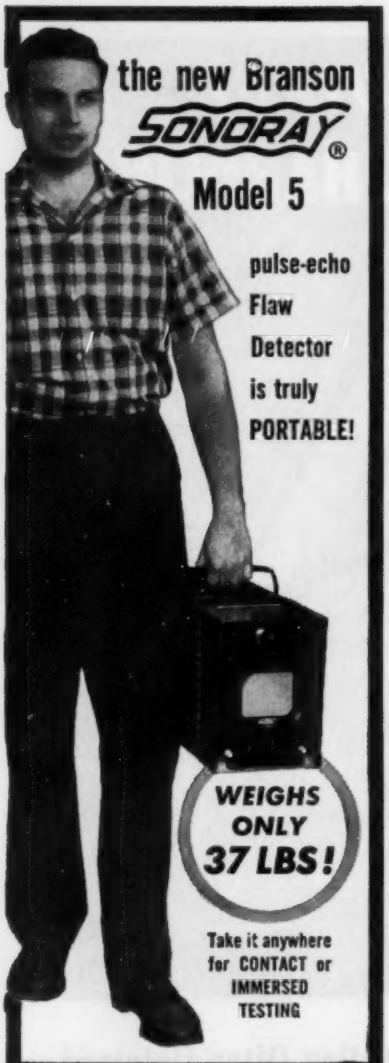

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Circle 644 on Page 55

to explain various means of widening markets for custom diecastings. Speakers and their subjects included H. W. Bollman, Newton-New Haven Co., "Initial Marketing Committee Objectives"; W. N. Brammer, Precision Castings Co., Cleveland Div., Precasco Corp., "What You Can Do for Your Customers"; Mr. Bollman, "What You Can Do for the Die Casting Industry"; and S. A. Gullo, Chicago White Metal Casting Inc., "What You Can Do for Yourself and Your Company."

Safety Awards—A feature of the afternoon session was the award of citations, in the form of certificates of merit, to ten institute member companies which had established outstanding safety records during the previous two years. These awards were presented by Norman Dress, Precision Castings Co., chairman of the institute's national safety committee, to the following companies: Ability Die Casting Co., Chicago; Aluminum Die Casting Co., Los Angeles; Century Die Casting Co., Chicago; DeCardy Bros. Co., Chicago; Dow Metal Products Co., Midland, Mich.; Hyatt Die Casting & Engineering Corp., El Segundo, Calif.; Midwest Die Casting Co., Milwaukee; Stella Products Corp., Livingston, N. J.; Titan Metal Mfg. Co., Bellefonte, Pa.; and West Irving Die Casting Co., Bensenville, Ill.

DCRF Activities — The second day of the meeting was devoted entirely to proceedings of the Die Casting Research Foundation, research arm of the institute. Foundation activities include such projects as the search for improved die materials and mold releases; an investigation of the area of metal flow in diecasting dies; and an analysis of various methods of die temperature control.

A considerable part of these sessions was devoted to evaluation of a compatible vacuum diecasting method developed by DCRF member companies to meet the needs of jobbing diecasters.

The foundation's vacuum diecasting method embodies the use of alternate systems which permit continuous evacuation of the die cavity only during the filling of the die and provide positive shutoff of metal flow from atmospheric pressure during evacuation. A massive gating technique is employed, in conjunction with special venting devices. Nearly 70 DCRF member companies currently are using the system.

Election of Officers—Top officers of the institute were re-elected to office for the coming year. Gordon C. Curry, Dollin Corp., Irvington, N. J., and Walter E. Brown, Kiowa Corp., Marshalltown, Iowa, were chosen to serve again as president and vice president, respectively. David Laine, ADCI secretary, also was re-elected.

Members of the national board of directors elected by the institute's four regional groups include W. G. Newton Jr., Newton-New Haven Co., eastern regional group; A. D. Weigolt, Precision Castings Co., central regional group; Fred Klement, West Irving Die Casting Co., midwestern regional group; and E. M. Woods, Aluminum Die Casting Co., Pacific Coast regional group.

Directors-at-large are F. W. Burgie, Doehler-Jarvis Div., National Lead Co.; Alfred Schneier Jr., Advance Pressure Castings Corp.; J. C. Bennett, Harvill Corp.; and Walter E. Brown, Kiowa Corp.

Chairmen of the regional groups include W. F. Feil, Aluminum Co. of America, eastern regional group; Norman Dress, Precision Castings Co., central regional group; Fred Klement, West Irving Die Casting Co., midwestern regional group; and E. M. Woods, Aluminum Die Casting Co., Pacific Coast regional group.

Doehler Award — The annual Doehler Award, highest honor of the diecasting industry, was presented to E. V. Blackmun, assistant chief metallurgist, Fabricating Div., Aluminum Co. of America. The presentation was made by Dr. Matthew A. Hunter, dean emeritus, Rensselaer Polytechnic Institute, who reviewed Mr. Blackmun's outstanding contributions to the technical achievements of the diecasting industry, particularly with respect to the Die Casting Research Foundation. Mr. Blackmun has been active in the foundation since its inception in 1952 and has served as a trustee and as chairman of its technical committee since 1955.

Austin T. Lillegren Awards—To perpetuate the memory of the late Austin T. Lillegren, a past presi-

dent and director of ADCI and chairman and a trustee of the DCRF, an award has been established to be presented annually to a person or persons in the institute and foundation for extraordinary service to those groups. At the time of his death, Mr. Lillegren was vice president, Madison-Kipp Corp. The first Austin T. Lillegren Awards were made to A. W. Simpson III, Western Die Casting Co., and to G. F. Hodgson, Doehler-Jarvis Div., National Lead Co.

Citations and mementos also were presented to past presidents of the institute.

Scholarship Award—In memory of the late Irving B. Hexter, former president, Industrial Publishing Co., an "Irving B. Hexter—Precision Metal Molding Memorial Award" has been provided by the magazine in the form of a scholarship. The educational committee of the DCRF Fund for Engineering Education has been requested by the publication to determine the recipient of scholarship, and the first award will be made next spring.

Zinc Diecasting of Year—A high light of the awards program was presentation of the "Zinc Die Casting of the Year Award" to Victor O. Anderson, A & A Die Casting Co., an ADCI member company. (See Page 178.) Presentation of the certificate and $1000 prize was made by R. C. Kenly, vice president, New Jersey Zinc Co., sponsors of the contest. Mr. Anderson turned the cash prize over to the DCRF Fund for Engineering Education to be used for scholarship purposes.

"He's head man of cupola charging"

Permanent mold foundry is lighted by 400-watt, twin open-top units spaced 13 ft 6 in. by 15 ft apart and mounted 14 ft high. Illumination averages 200 foot-candles

Foundry Provides for

200 Foot-Candles of Illumination

1000-watt mercury lamps on 12 by 15 ft centers and mounted at heights from 24 to 27 ft

● WHEN Aluminum Casting & Engineering Co., Milwaukee, added 15,000 square feet of floor space to its permanent mold foundry, it consulted Wisconsin Electric Power Co. about proper lighting. Lighting engineer Richard L. Garber of the power company helped the foundry management decide on the proper level of lighting to be installed.

Original plans called for an installation to provide lighting of 50 footcandles. Mr. Garber questioned whether this level would be sufficient to detect unsound castings. Typical flaws were tiny hairline cracks in the web of the castings. Quick testing showed that these flaws were not readily detectible by a person with good eyesight under lighting of less than 100 foot-candles.

To arrive at the best determination of proper lighting level, Mr. Garber used a General Electric See Level comparator. This device offers a means for checking relative visibility of seeing tasks in side-by-side compartments of a portable box. Management and foremen used the device to find the proper lighting level for the tasks to be performed in the new building.

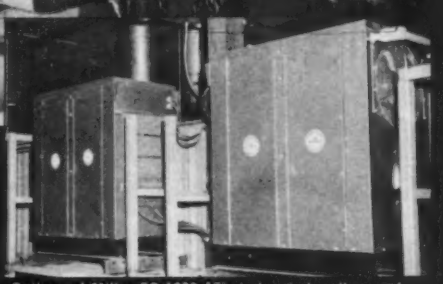
The lighting necessary to make the hairline flaws stand out most clearly was found to be 600 foot-

Foundries Find

miller-powered carbon arc cutting

Faster — Cheaper — Better

These photos, taken in well-known foundry, show operator carbon-arc cleaning a casting using an Arcair torch powered by a Miller SR-1000-A7. Note handiness of control console.



Battery of Miller SR-1000-A7's is located well away from cleaning room.

THE MILLER MODEL SR-1000 series, providing 1000 amperes of d-c at 40 arc volts, 100% duty cycle, has proved to be the ideal power source for Arcair and other foundry carbon arc cutting processes. Designed and built around Miller's exclusive semi-metallic, completely sealed Gold Star rectifier, drastic overloads are handled routinely without failure or deterioration. Control console is instantly removable to any reasonable distance. Adjustment of current range from 200 to 1400 amperes is accomplished under load. What's more, the operator can switch in a flash from cleaning and gouging to welding when needed. Operates from three phase power lines.

For applications involving carbon arc cutting, heavy submerged arc welding, plasma jet and electric furnace processes, the Miller SR-1000 series is probably without an equal. May we send you more complete details and specifications?

MODEL SR-1000-A7

miller ELECTRIC MANUFACTURING COMPANY, INC.

Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

APPLETON, WISCONSIN

Circle 646 on Page 55

candles. Peter Paul Hoffman, vice president of Aluminum Casting & Engineering, said: "Our company had not given too much thought to the illumination requirements for our operation. However, after we had made a careful study of comparative visibility with the comparator, we agreed with Mr. Garber that we would not be satisfied with 50 footcandles. Indeed, for the most nearly perfect results, we would have chosen a level in excess of 500 footcandles. This seemed too much for prudent foundry investment at this time. So we settled on the system we now have."

In part of the new building which has a lower ceiling than the rest, the lighting system employs twin units on 13½ x 15 ft centers. These fixtures are equipped with 400-watt, color improved, mercury lamps mounted at a height of 14 ft. The area with the higher ceiling uses 1000-watt, semireflector, color improved mercury lamps mounted 24 to 27 ft high. These units are spaced at 12 x 15 ft centers. All lamps have open-top reflectors to provide some lighting for the ceiling area.

With lamp arrangement such as this, the average illumination was measured to be about 200 footcandles for the entire floor space after about six months of operating on three shifts. Concerning the new installation, Mr. Hoffman points out that "the experience is still so new we hesitate to offer conclusions now. We definitely feel, however, that the new lighting will give us an improvement in over-all production, maybe 2 or 3 per cent, maybe more. We expect a significant reduction in hazards peculiar to our industry."

The revolutionary Bliss Pulsation Burner

produces temperatures never before achieved with oil or natural gas. Burning oil, it can reach a searing 3450°F. On 1000 BTU/cu. ft. natural gas, it develops 3320°F. Both these extremely high temperatures are close to the theoretical limits for these two fuels. Foundries, smelters, heat treaters and other metal processers have been quick to take advantage of the remarkable combustion efficiency of these new burners. To them, it has meant faster heating cycles, cleaner flue gases, and above all, fuel economy that cuts from 12% to 30% from their furnace overhead. Not to speak of reduced maintenance on refractory linings.

To learn how the Bliss Burner can increase the heat output in your plant while it's saving you money in fuel and furnace maintenance, write today for our Bulletin No. 60. It's yours for the asking.

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Book Review

Aluminiumguss in Sand und Kokille **(Aluminum Casting in Sand and Metal Molds) by Roland Irmann, cloth, 302 pages, 5⅞ x 9 in., published by Aluminium-Verlag GmbH, Duesseldorf, Germany. Price 42 DM.**

This sixth revised and expanded edition of an authoritative German work on aluminum casting contains 12 chapters relating to aluminum castings and their production in sand and metal molds.

The first chapter discusses raw materials and the second describes the effect of melting and solidification processes on casting quality. The most important technical aluminum casting alloys are covered in chapter three, and melting equipment and temperature measurement receive attention in chapter four. Details on melt treatment for refining and grain size control are presented and discussed in the fifth chapter.

Sixth and seventh chapters are devoted to production of castings by the sand and metal mold processes, and the eighth chapter is concerned with cleaning of castings and surface finishing. Salvage or repair methods and heat treatment are described in the next two chapters. Chapters eleven and twelve discuss physical properties and testing, and the proper design of aluminum castings.

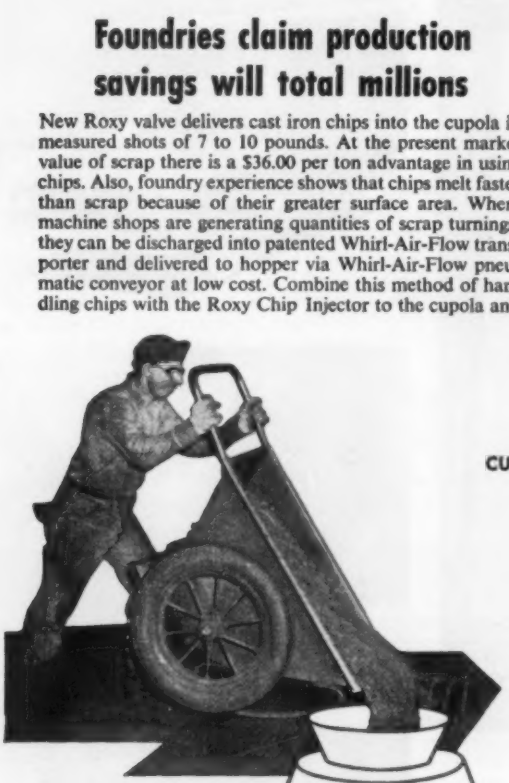
An appendix lists the principal defects, their causes and remedies, and a table listing various aluminum casting alloys, their physical properties, compositions, etc.

SAVE $36.00 a ton on cast iron chips

New Whirl-Air-Roxy method delivers chips from Machine Shop to Cupola *(patented)*

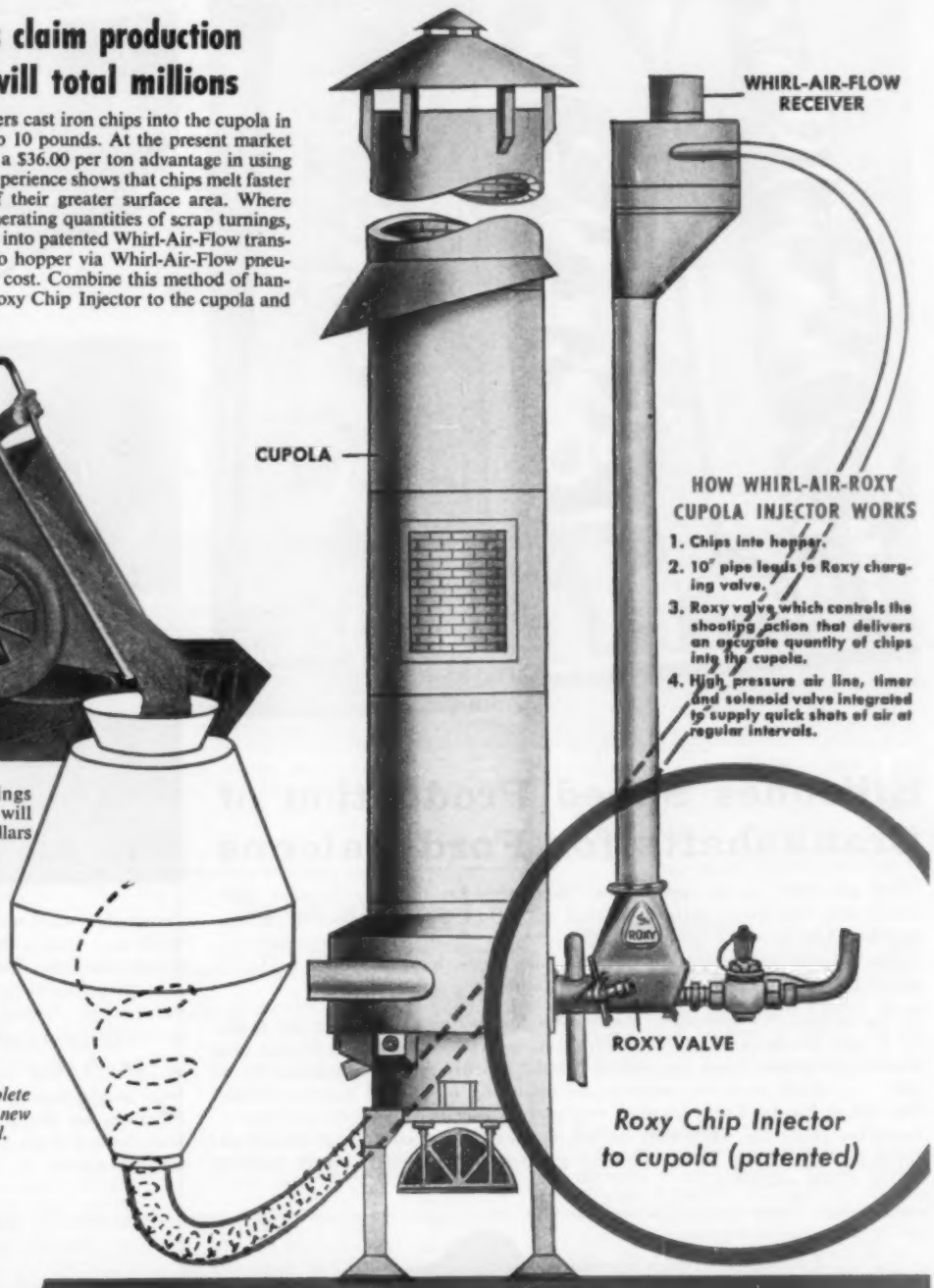
Foundries claim production savings will total millions

New Roxy valve delivers cast iron chips into the cupola in measured shots of 7 to 10 pounds. At the present market value of scrap there is a $36.00 per ton advantage in using chips. Also, foundry experience shows that chips melt faster than scrap because of their greater surface area. Where machine shops are generating quantities of scrap turnings, they can be discharged into patented Whirl-Air-Flow transporter and delivered to hopper via Whirl-Air-Flow pneumatic conveyor at low cost. Combine this method of handling chips with the Roxy Chip Injector to the cupola and



you will achieve savings that foundrymen say will amount to a million dollars in very few years of operation. The Whirl-Air-Roxy method is easily applied to any size foundry; small, medium or large. Initial cost is low and savings will pay for installations in a period of a few months. We invite your exploratory inquiry.

Write or wire for complete information on the new Whirl-Air-Roxy method.


WHIRL-AIR-FLOW RECEIVER
CUPOLA
HOW WHIRL-AIR-ROXY CUPOLA INJECTOR WORKS
1. Chips into hopper.
2. 10" pipe leads to Roxy charging valve.
3. Roxy valve which controls the shooting action that delivers an accurate quantity of chips into the cupola.
4. High pressure air line, timer and solenoid valve integrated to supply quick shots of air at regular intervals.
ROXY
ROXY VALVE
Roxy Chip Injector to cupola (patented)

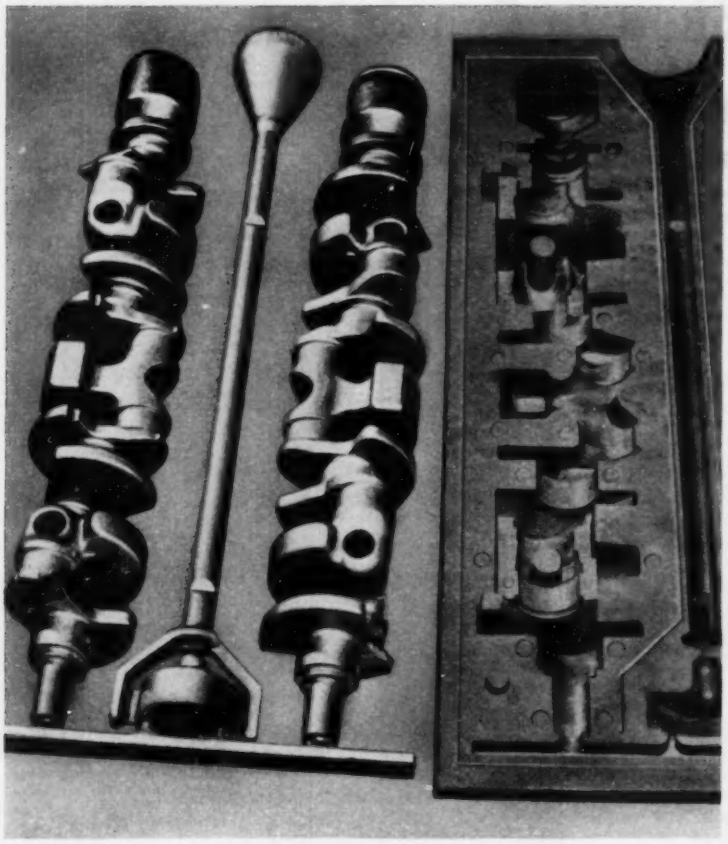
WHIRL AIR FLOW PNEUMATIC CONVEYORS

WHIRL-AIR-FLOW

Circle 648 on Page 55

SILICONE NEWS from Dow Corning

For Fast Get-away



Silicones Speed Production of Crankshafts for Ford Falcons

"Fast get-away" is an appropriate description for the way foundry shell molds pop free from patterns coated with Dow Corning silicone parting agents. Quick, clean and easy release every time helps assure uninterrupted production, retention of close tolerances, less machining. Here's proof from the Ford Motor Company foundry.

In one production operation, shell molds for casting crankshafts are made on a high production, multi-station rotating machine. Failure of just one shell to separate from its pattern would quickly bring operations to a halt . . . result in waste, rejects and mounting labor and material costs. But not at Ford. Their foundry engineers prescribed the right preventive medicine years ago when they settled on an emulsion of silicone as a shell mold parting agent. All it takes for good results is a light spray coating of the dilute emulsion.

In another shell mold operation Ford dips multi-unit engine valve patterns in the dilute emulsion. Even with such deep draws as are encountered with small diameter valve stems, release is clean and easy . . . production stays on schedule.

If lack of "fast get-away" is hampering your production, why not put Dow Corning Silicones on the job? Send today for a free manual detailing "how to use silicone parting agents in shell molding."

Address Dept. 4111

For complete technical information about any silicone product, contact the Dow Corning office nearest you.

first in silicones

Dow Corning CORPORATION

MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

Literature for Foundrymen

For More Information Use Reader Service Card—Page 55

Inspection Machines

Bulletin 73-100 describes various models of magnetic particle inspection machines and includes information on accessories and equipment for nondestructive testing.—**Sperry Products Co.**, division of Howe Sound Co., Merriam, Kans.

For More Details Circle No. 406—Page 55

Vacuum Cleaners

Leaflet No. 34 describes line of vacuum cleaners and gives specifications and ordering information. Leaflet also contains illustrations of various accessories.—**Black & Decker Mfg. Co.**, Towson 4, Maryland.

For More Details Circle No. 407—Page 55

Lift Hoist

Bulletin B-1403-B describes design improvements in electromagnetic lift hoist. Illustrations of applications are included.—**Dings Magnetic Separator Co.**, 4761 W. Electric Ave., Milwaukee 46, Wis.

For More Details Circle No. 408—Page 55

Diecasting Machines

Leaflet describes various models of diecasting machines and includes specifications for these models.—**American Die Casting Machinery Co.**, 1516 W. Thomas St., Chicago 22, Ill.

For More Details Circle No. 409—Page 55

Metal Tooling Compound

Booklet offers price lists and application instructions for company's epoxy metal tooling resins for patterns, dies, laminates, castings, and impregnations.—**Metarez Inc.**, Idyll Dell Rd., P. O. Box 507, McHenry, Ill.

For More Details Circle No. 410—Page 55

Wire Rope and Slings

Handbook called "Tuffy Tips" illustrates abuses and correct uses of wire rope and slings. The 26-page booklet also contains classification and specification data.—**Union Wire Rope**, subsidiary of **Armco Steel Corp.**, 2100 Manchester Ave., Kansas City 26, Mo.

For More Details Circle No. 411—Page 55

Portable Test Kits

Illustrated brochure provides complete information and prices on briefcase-size test kits.—**Magnaflux Corp.**, a subsidiary of **General Mills**, 7301 W. Ainslie Ave., Chicago 31, Ill.

For More Details Circle No. 412—Page 55

Compressor Selection

Bulletin P-13 features a six-step do-it-yourself performance calculation method for selection of the proper compressor for most applications. Technical data describe a variety of parts, seals, and lubrication systems for single-stage compressors with capacities from 700 to 100,000 icfm and above.—**Elliott Co.**, Compressor Dept., Jeannette, Pa.

For More Details Circle No. 413—Page 55

Shell Core Machines

Bulletin SC-1 illustrates and describes two shell core machines, C1015 and C2021, one manual, the other automatic. Specifications also are provided.—**Osborn Mfg. Co.**, 5401 Hamilton Ave., Cleveland 14, Ohio.

For More Details Circle No. 414—Page 55

Storage Racks

Booklet with 28 pages points out disadvantages of buying racks not designed to sustain specific loads.—**Paltier Corp.**, Michigan City, Ind.

For More Details Circle No. 415—Page 55

Combustion Safeguards

Bulletin CS-2 gives details on combustion safeguards. It contains data on dimensions, installation, and use.—**Selas Corp. of America**, Dresher, Pa.

For More Details Circle No. 416—Page 55

Tractor Crane

Pamphlet describes tractor crane Model 20RM2, with 2000-lb capacity.—**Drott Mfg. Corp.**, Milwaukee 15, Wis.

For More Details Circle No. 417—Page 55

Did You Miss These?

Here is a list of popular literature items offered in recent months:

INVESTMENT CASTING PROCESS —Shaw Process Development Corp., division of British Industries Corp., Port Washington, N. Y. Circle 402, Page 55.

ARC WELDING (Vest Pocket Guide to Better Welds)—Hobart Bros. Co., Troy, Ohio. Circle 403, Page 55.

ALUMINUM ALLOY MODIFIER (Leaflet B9)—Foundry Services Inc., Cleveland 35, Ohio. Circle 404, Page 55.

HIGH-ALLOY CASTINGS — Alloy Casting Institute, Garden City, N. Y. Circle 405, Page 55.

Lifting Magnets

Eight-page bulletin No. 112A describes and lists specifications for several types of lifting magnets.—**Ohio Electric Mfg. Co.**, Maple Heights, Ohio.

For More Details Circle No. 418—Page 55

Grouting Practices

Bulletin E-1d covers common methods of grouting different types of equipment, mixing and placing of grout, and cold and hot weather grouting.—**Master Builders Co.**, division of American-Marietta Co., Cleveland 18, Ohio.

For More Details Circle No. 419—Page 55

Air Hammer

Bulletin 660 describes company's improved air hammer, Air Ace. Tools for use with the hammer also are shown.—**Dotmar Industries Inc.**, 502 Hanselman Bldg., Kalamazoo, Mich.

For More Details Circle No. 420—Page 55

Flooring and Stair Tread

Solid and open types of steel and aluminum flooring and stair tread are illustrated and described in Bulletin 50-9. Specification and installation data are included.—**Joseph T. Ryerson & Son Inc.**, Box 8000-A, Chicago 80, Ill.

For More Details Circle No. 421—Page 55

Scale Models

Folder illustrates industrial scale models and their applications in industry. Also shown are numerous product models available.—**Knight Models Inc.**, 549 W. Randolph St., Chicago 6, Ill.

For More Details Circle No. 422—Page 55

Elevator Furnace

Four-page Bulletin GED-4092 deals with electric furnaces for stress relieving and annealing of large parts or heavy loads. Cutaway drawing of furnace shows construction features.—**General Electric Co.**, Schenectady 5, N. Y.

For More Details Circle No. 423—Page 55

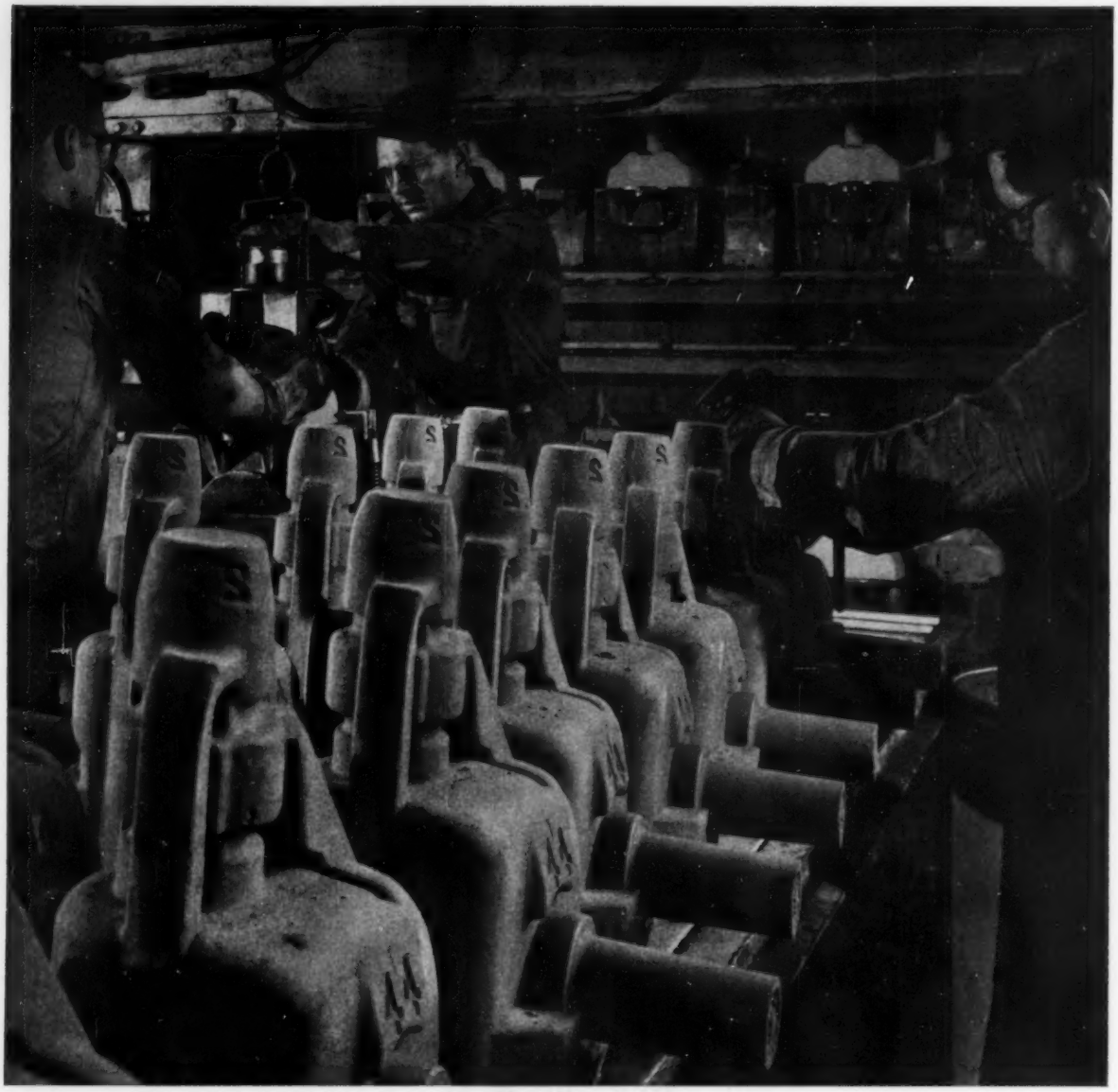
Space Heaters

Portable, oil-fired space heaters in five different sizes ranging from 100,000 through 1,000,000 Btu per hr are described in Catalog 6016. Specifications and photographs are included.—**Stow Mfg. Co.**, 23 Shear St., Binghamton, N. Y.

For More Details Circle No. 424—Page 55

Diecasting Tool Steels

Booklet ADV 182-1500 describes tool steels for use in the diecasting industry. This booklet contains diagrams of



Cores bake fast... really hold together with

PENOLYN 178 CORE OIL

Each of the automobile differential carrier cores shown above weighs about 40 pounds. And each core was baked in a vertical conveyor oven at 480°F with a *1-hour cycle*, load to unload. To obtain this fast baking time, the foundrymen used PENOLYN 178. In addition to speed, this clean-working core oil provided them—as it will provide you—with high-baked strength, toughness, and optimum collapsibility.

As a leading producer and nation-wide marketer of core oils for 30 years, Penola is quite proud of its position as a leader in the development of new and more efficient core oils. For further information, contact your nearest Penola office or write:
15 West 51st Street, New York 19, New York.

Penola

HUMBLE OIL & REFINING COMPANY, PENOLA DIVISION NEW YORK • DETROIT • CHICAGO

QUALITY · RELIABILITY · FAST DELIVERY · TECHNICAL ASSISTANCE

hot and cold-chamber diecasting machines, die steel size, heat treatment charts, and hardness tables.—**Crucible Steel Co. of America**, Oliver Bldg., Mellon Square, Pittsburgh 22, Pa.

For More Details Circle No. 425—Page 55

CO_2 in Welding

Eight-page brochure covers characteristics of CO_2 gas-shielded metalarc welding of mild and low alloy steel, the advantages of CO_2 in welding, and various processes employing CO_2 as a shielding gas.—**Pure Carbonic Co.**, a division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 426—Page 55

Dust Control

Dry centrifugal, wet, and fabric collectors and electrostatic precipitators are discussed in Bulletin 271. Thirteen products, their capacities, and specific applications are explained and illustrated.—**American Air Filter Co., Dept. PD**, 215 Central Ave., Louisville 8, Ky.

For More Details Circle No. 427—Page 55

Hot-Process Coreblower

Booklet reports on "Hot Process" coreblower HP-4 and lists specifications. Photographs of the machine and of cores made on this model are included.—**Redford Iron & Equipment Co.**, 20733 Glendale, Detroit 23, Mich.

For More Details Circle No. 428—Page 55

Painting Guide

Twenty-four page book discusses different uses for various types of primers and finish coats and shows samples of colors available. It describes a number of special-purpose paints and details their properties and recommended application methods.—**Industrial Maintenance Div., Sherwin-Williams Co.**, Cleveland 1, Ohio.

For More Details Circle No. 429—Page 55

Shell Sand Unit

Bulletin 1040 discusses shell sand package unit for cold and warm process. Leaflet also describes an air heating unit and automatic timing control unit.—**Beardsley & Piper**, division of Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago 39, Ill.

For More Details Circle No. 430—Page 55

Combustion Equipment

Catalog describes gas-combustion and control equipment, including blowers and accessory items. It gives data on size range, capacity, and applications of more than 55 types of products.—**Bryant Industrial Products Corp.**, 17700 Miles Ave., Cleveland 28, Ohio.

For More Details Circle No. 431—Page 55

Vacuum Impregnation

Advantages of vacuum impregnation are presented in detail in 16-page Catalog 652. This brochure describes vacuum impregnating systems and gives specifications for standard cylindrical and rectangular impregnating chambers.—**F. J. Stokes Corp.**, 5500 Tabor Rd., Philadelphia 20, Pa.

For More Details Circle No. 432—Page 55

Bin Boxes

Twelve-page brochure, "Bin Boxes," covers economics, design considerations, material requirements, types, and features of unit load containers.—**National Wooden Box Assn.**, 402 Barr Bldg., Washington 6, D. C.

For More Details Circle No. 433—Page 55

Mount Press

Digest discusses press for mounting of metallurgical samples, preheater, and accessories. It gives specifications of press as well as over-all dimensions of preheater and accessory rack and prices of all items.—**Buehler Ltd.**, 2120 Greenwood St., Evanston, Ill.

For More Details Circle No. 434—Page 55

Manifolds and Regulators

Gas regulators and portable manifolds are described and illustrated in 16-page catalog F-55-085, which includes specifications and ordering information and inlet and outlet connections.—**Linde Co.**, 270 Park Ave., New York 17, N. Y.

For More Details Circle No. 435—Page 55

Electric Lift Truck

Bulletin 4000 covers specifications, performance data, and advantages of company's electric lift truck and includes diagrams showing its maneuverability.—**James Campbell Smith Inc.**, Willoughby, Ohio.

For More Details Circle No. 436—Page 55

Pallet Handling

Booklet, *ABC of Pallet Handling*, illustrates different types of pallets and explains their uses. Advantages of wood and metal pallets are listed, and pallet specifications are included.—**Raymond Corp.**, 65-184 Madison St., Greene, N. Y.

For More Details Circle No. 437—Page 55

Air Hoists

Twelve-page catalog contains specifications for several models of hook-mounted and trolley-mounted air hoists. Several accessories also are described.—**Aro Equipment Corp.**, Bryan, Ohio.

For More Details Circle No. 438—Page 55

Double-Acting Cylinders

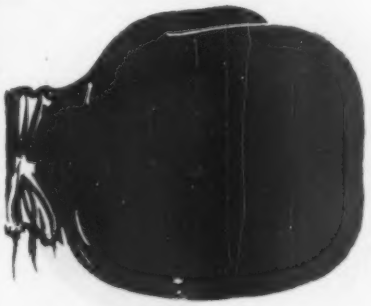
Double-acting cylinders for heavy-duty service are described in Bulletin 73245.—**Oilgear Co.**, Milwaukee 4, Wis.

For More Details Circle No. 439—Page 55

Extensometer

Brochure 522 describes single-piece extensometer used to indicate the elongation of metallic and plastic specimens. The unit is adjustable to take rectangu-

LIGHTWEIGHT



or

HEAVY WEIGHT

SEE NEXT PAGE . . .

in the *fine* **FANNER LINE**

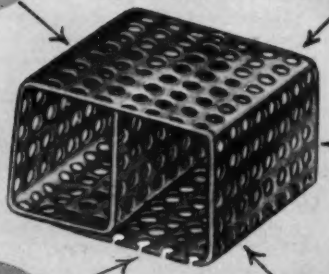
FOR
LIGHT
CASTINGS

PERFORATED CHAPLETS
in a wide range of sizes

LARGE SUPPORT AREA
Holds core more securely in place.

FLEXIBLE SHAPE
10 styles fit any shape or contour — flat, curved, wedge-shaped, bridged or with extended ends.

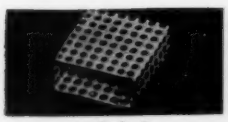
PERFORATIONS
Large number of perforations in light metal insure perfect fusion in light castings.



WILL NOT CHILL
Large perforated area eliminates concentration of metal at any point to chill and cause leaks.

PERFECT VENT
No gas or air pockets to cause "blow-holes", thus perfect ventilation is secured.

ACCURATELY MADE
Produced to exacting standards on specially designed machines to meet specifications.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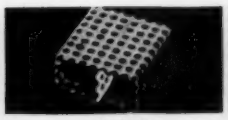
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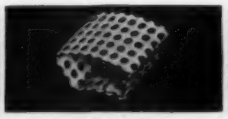
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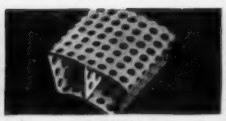
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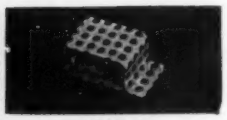
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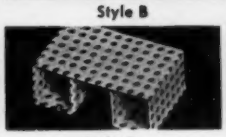
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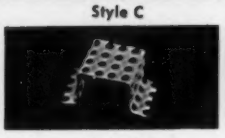
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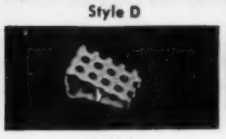
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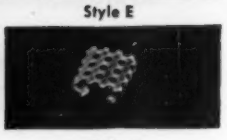
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TYPICAL APPLICATIONS

MANIFOLD

STOVE

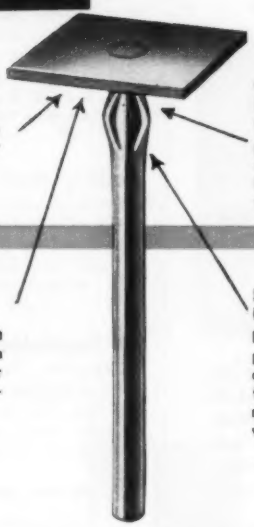
Fine FANNER Perforated Chaplets are the perfect answer for many casting applications where there is no need for heavy core support. Their lightweight, wide support area and readily shaped contours, in addition to their many other features make them almost universally adaptable. They are made of tin-coated sheet steel for ferrous castings; and of aluminum, copper or brass for use in castings of these metals—in 38 sizes from ⅛"x ¼"x ¼" to 1" x 2" x 2". Write for catalog

there's the perfect chaplet for every need

FOR **HEAVY** CASTINGS

WROUGHT IRON FORGED OR FITTED

single head chaplets



SPECIAL FORM-FITTING HEADS
Formed to specification to fit cores of almost any desired shape.

COUNTERSUNK SHOULDER
Tapered Fanner design provides more complete contact with molten metal by eliminating corners where gas pockets form.

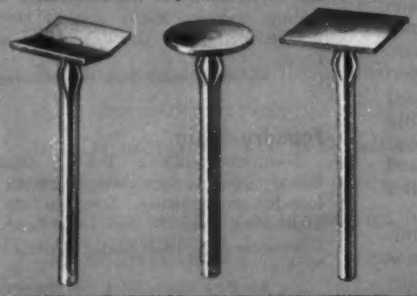
HEAVY SHOULDER
Extra-heavy construction at shoulders provides maximum support for heavy cores without excess of metal.

SUPERSTEM CONSTRUCTION
Broad angle Superstem provides extra strength and greater fusion area for molten metal. Furnished with Groovestem when specified.

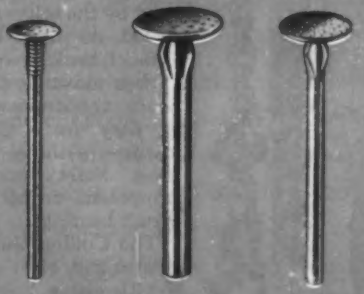
NON-SLIP HEAD
Prevents side-slipping, provides more rigid support when in place.

FORGED HEAD
Upset in forging to three times stem diameter, extra strength offers greatest support to core.

WROUGHT IRON FITTED SINGLE HEAD CHAPLETS
Round or Square Heads — Curved, Angled or Straight
Available with Superstem or Threaded Stem



WROUGHT IRON FORGED SINGLE HEAD CHAPLETS
Available with Superstem or Threaded Stem



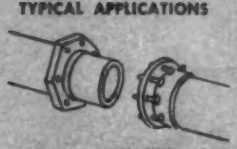
These two types of FANNER Chaplets can be depended upon to handle the heaviest cores. Seven head sizes and stems from 3" to 20" are available for immediate delivery. Remember, when you standardize on FANNER, you always get exactly the right chaplet for every need!

THE FANNER MANUFACTURING COMPANY

Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK CLEVELAND 9, OHIO

TYPICAL APPLICATIONS



SOIL PIPE

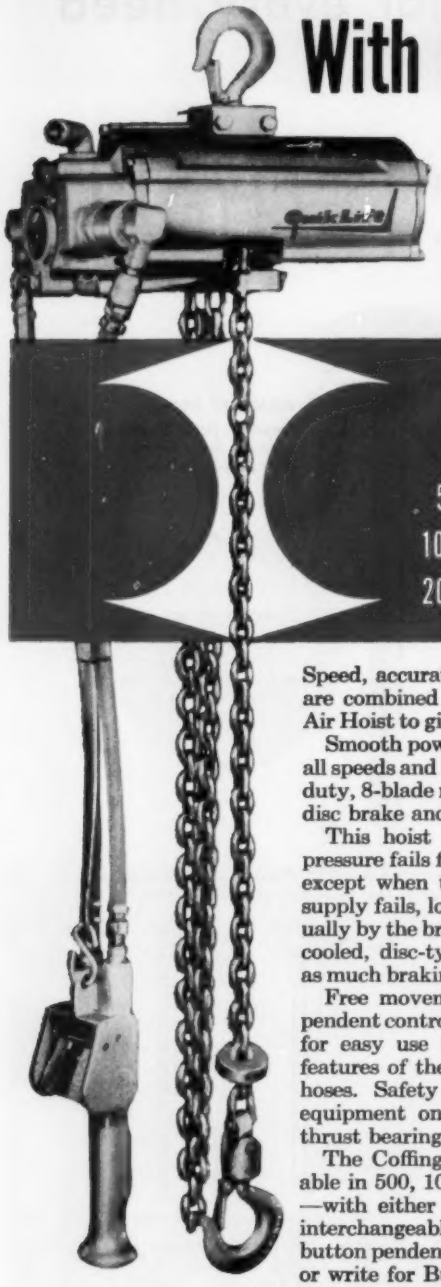
HEAVY DUTY PUMP

HEAVY TRACTOR

DIESEL MOTOR

Circle 651 on Page 55

Faster Load Lifting With New Coffing Quik-Lift Air Hoist



12 MODELS
lift full load 10 feet
500-pound hoist— 7 seconds
1000-pound hoist— 9 seconds
2000-pound hoist—24 seconds

Speed, accurate control, safety and long life are combined in the new Coffing Quik-Lift Air Hoist to give you efficient hoisting power.

Smooth power flow and absolute control at all speeds and loads is provided by the heavy-duty, 8-blade rotary air motor, the air-cooled disc brake and sensitive controls.

This hoist will not drop its load if air pressure fails for the brake is always engaged except when the motor is activated. If air supply fails, load can be safely lowered manually by the brake adjustment screw. The air-cooled, disc-type brake provides four times as much braking area as conventional brakes.

Free movement so that the push-button pendent control is always correctly positioned for easy use is provided by the swiveling features of the air supply hose and pendent hoses. Safety hooks, which are standard equipment on all models, swivel on roller thrust bearings.

The Coffing Quik-Lift Air Hoist is available in 500, 1000 and 2000-pound capacities —with either link or roller chain and with interchangeable manual pull-cord or push-button pendent controls. Ask your distributor or write for Bulletin ADH-79.

COFFING HOISTS

DUFF-NORTON COMPANY

Four Gateway Center • Pittsburgh 22, Pa.

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

Circle 652 on Page 55

lar or round specimens.—Testing Machines Inc., 72 Jericho Turnpike, Mineola, N. Y.

For More Details Circle No. 440—Page 55

Silicone Grease

Form 6-206 explains the use of oxidation-resistant silicone grease for lubrication at high temperatures. It also shows various applications of silicone 41 and describes its properties.—Dow Corning Corp., Midland, Mich.

For More Details Circle No. 441—Page 55

Industrial Trucks

Twenty-four page brochure shows company's new industrial equipment line. Photographs, drawings, operating information, and specification material are included.—Massey-Ferguson Industrial Div., 1009 S. West St., Wichita 13, Kans.

For More Details Circle No. 442—Page 55

Walking Beam Conveyor

Brochure discusses the advantages of company's walking-beam conveyor and typical uses for it.—Conveyor Corp., 19815 E. Nine Mile Rd., St. Clair Shores, Mich.

For More Details Circle No. 443—Page 55

Air Separators

Capacities, sizes, prices, and specifications of company's compressed air separators are described in booklet. Operation is explained, and features are listed.— Jas. A. Murphy & Co., Hamilton, Ohio.

For More Details Circle No. 444—Page 55

Wheel Dressers

Catalog shows all of company's line of wheel dressers and replacement parts. An explanation of the tangential angle feature and its origin also is given.—L. Newman, 1001 24th St., Oakland 7, Calif.

For More Details Circle No. 445—Page 55

Foundry Resin

Technical bulletin F-3-Rc describes flaked phenol formaldehyde resin for foundry sand coating. Specifications and application are included.—Reichhold Chemicals Inc., RCI Bldg., White Plains, N. Y.

For More Details Circle No. 446—Page 55

Tractors and Equipment

Two booklets describe various models of tractors and other industrial equipment, including attachments. Booklets CTS-165 and CTS-164 also contain performance charts and illustrations.—J. I. Case Co., 700 State St., Racine, Wis.

For More Details Circle No. 447—Page 55

High-Temperature Mortar

Bulletin No. 601 gives technical data on wet air-setting, high-temperature mortar.—J. H. France Refractories Co., 1944 France Rd., Snow Shoe, Pa.

For More Details Circle No. 448—Page 55

"SUPER-STEEL"

STEEL SHOT *and* GRIT

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Circle 653 on Page 55

Steel Founders Plan Promotion Program

By FRANK G. STEINEBACH
Editorial Director

● AS A PRELUDE to celebration of the centennial of the founding of the steel castings industry, members of the Steel Founders' Society of America, at the annual fall meeting, listened to an appraisal of progress and plans for stronger action. The meeting was held Sept. 19-20 at the Homestead, Hot Springs, Va.

The society was told that although it has made excellent technical progress, needs of customers and developments of competing industries necessitate still greater strides in product development.

The industry was accused of neglecting its merchandising practices and ignoring the promotion of its products, especially through lack of an aggressive program of business paper advertising. As a part of good business, steel foundrymen also were urged to take a more active interest in government and politics.

"Do you guys want to sell castings? If you do, why don't you come and tell me about it?" That was the challenge laid down by Harold N. Bogart, manager, Process Development, Manufacturing Research Office, Ford Motor Co., Dearborn, Mich., to introduce his talk, "Competition Sharpens Casting Perspective." In an imaginative sales call, Mr. Bogart took the part of a hard-boiled purchasing agent and promptly beat down the sales arguments of the castings salesman. He wanted to know why the price did not meet that of competitive materials, why delivery had not been met on a previous order, why the quality was not satisfactory, etc. It was plain, as it is with many purchasing agents, that he did not want to change, that he was quite satisfied with things as they are.

When the PA had exhausted his arguments and the castings salesman hung on, the chief engineer was called in, and another series of reasons why it couldn't be done was advanced. Here, Mr. Bogart, as chief engineer, pointed out that accepted engineering handbooks show that the part in question — as, for example, a crankshaft — cannot be made as a casting. Therefore, why should his company be a guinea pig?

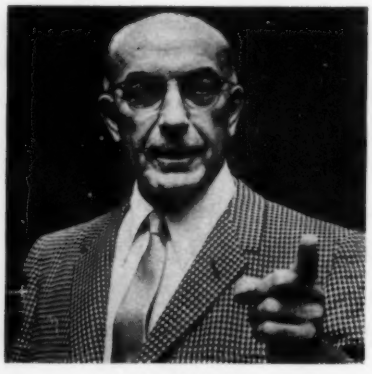
The chief engineer, as portrayed by Mr. Bogart, then questioned the progress of the foundry industry during the past 20 years while he pointed to splendid developments in other lines. Mass production organizations have been benefited by one branch of the industry which has moved ahead by making a product that almost eliminates machining and does not require any chips. "What have steel casting producers done in that direction?" he asked. Other avenues of progress were questioned similarly.

Abandoning his characterization of the PA and CE, Mr. Bogart then discussed some of the things that should strengthen demand for the products of the foundry. First of all, it should be repeated that a casting is the shortest route to a finished product. If it is, he asked, why can't it be made cheaper? The speaker then discussed the advantage of making an assembly of parts as a single casting and the possibility of using a wider range of materials than offered by other industries. Mr. Bogart emphasized that foundries need to provide the full scope of manufacturing potentials.

He suggested closer co-operation with customers so that mistakes in design can be corrected before it is too late. Changes must be made in handbooks which currently downgrade castings. More emphasis on educating top engineers on the potentials of castings is a must. Properties need to be improved, inspection given more attention, and every effort made to produce the type of casting the customer wants and needs.

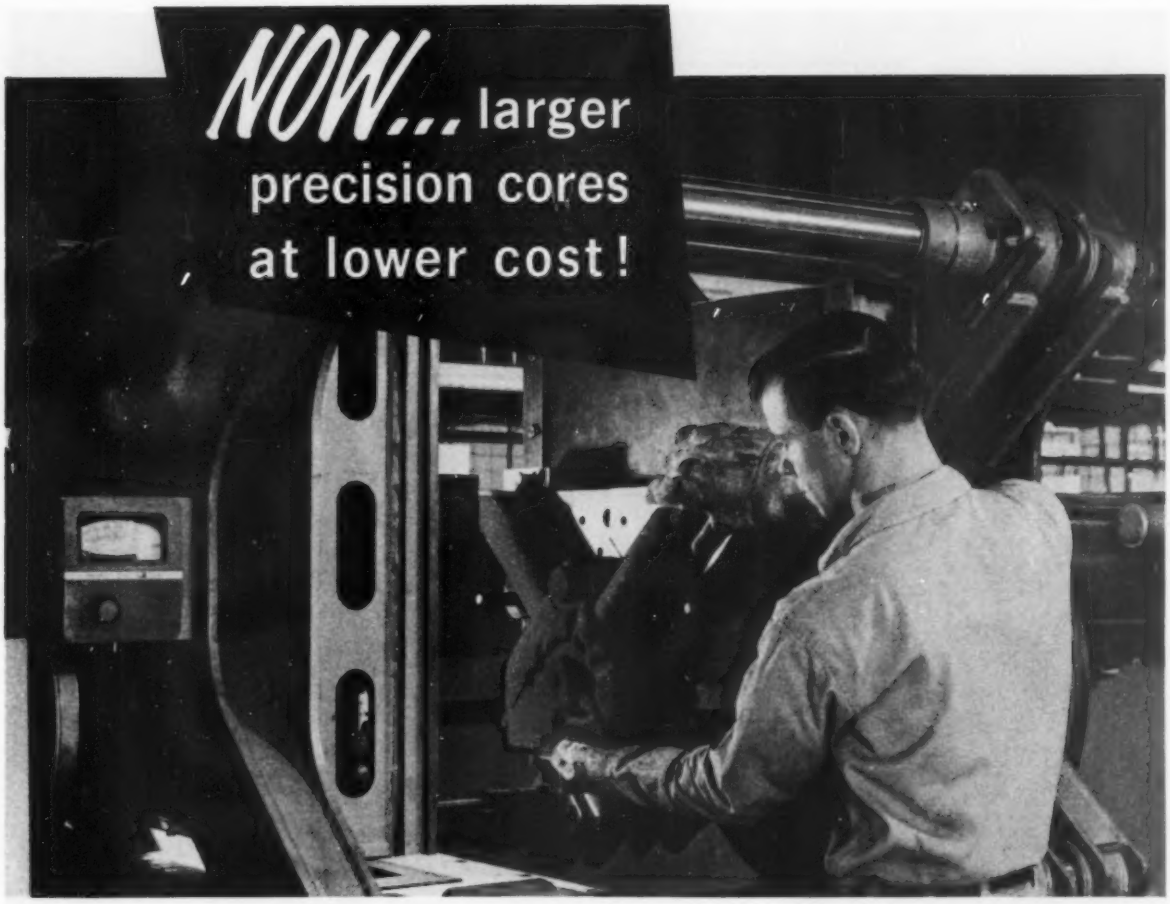
Speaking on "Steel Castings —

HAROLD N. BOGART
Ford Motor Co.



B. P. HAMMOND
Blaw-Knox Co.

W. S. CLEMENT
Dodge Steel Co.



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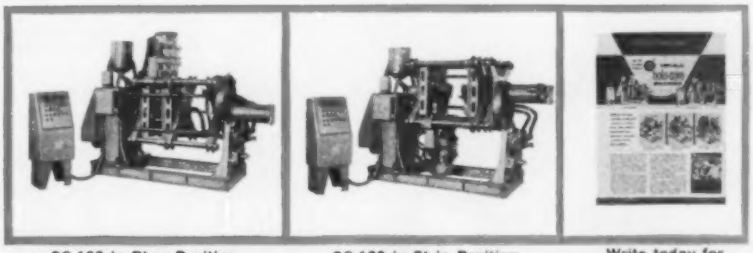

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the Product without a Voice," W. S. Clement, advertising manager, Dodge Steel Co., Philadelphia, charged that the steel foundry industry is spending only 0.007 of 1 per cent of its gross sales on group advertising. This, he pointed out, was just about the total amount being put forth to promote castings over other methods of fabrication, and the effect of the expenditure was further diluted by the exclusive use of direct mail, "one of the most expensive and least widespread of all possible media." A study in one section of the country showed practically no expenditure for advertising by individual foundries, he stated. The speaker deplored the fact that the SFSA is not promoting steel castings, that individual steel foundries are not promoting steel castings—in fact, that nobody is promoting steel castings.

Work Left to Salesman

All of the promotion effort, all of the work of seeking out markets, all of the work of creating interest, making proposals, getting the order, and keeping the customer sold is left to the salesman. At something around $20 a call, this approach is an expensive and hopeless process.

Mr. Clement reported that competitors are building acceptance for their products through business paper advertising at a cost of 1½ cents per contact. Business paper advertising, he pointed out, as contrasted to retail advertising, does not sell goods. But it does perform four of the major selling functions cheaply and effectively. It can find new prospects or tell the story to numerous key people in a plant. Advertising in business papers can arouse interest and can create a preference. Furthermore, it can keep the customer sold. Mr. Clement stated that the Advertising Committee of the society is preparing a program which will be presented at divisional meetings, and he urged an active interest in the campaign.

B. P. Hammond, vice president, Eastern Castings Sales, Blaw-Knox Co., Foundry & Mill Machinery Group, Pittsburgh, fired the first gun in the centennial year celebration with a scholarly presentation entitled "The First Century S.C." Mr. Hammond detailed the early beginnings of the steel castings industry, its growth and technical progress over the years, and its service to industries, especially railroads and shipbuilding.

Fifty-eight years ago, the Steel Founders' Society of America was formed in New York with 17 members. It had its origin in the instinct of self-preservation, mutual advancement, and the common good. Many men have served and are serving the industry through the society, and Mr. Hammond paid tribute to a number of them.

In observing the 100th anniversary of the industry, the society next year will be given a crusading voice to tell the industrial world about steel castings. It will not be a story of the early days or even of today, but will concern the future of an industry now 100 years young. A strong and healthy steel castings industry is vital to America.

Wilson H. Moriarty, first vice president and group executive, National Malleable & Steel Castings Co., Cleveland, and president of the society, reported on the special and regular activities of that organization.

He stated that since nothing in this world is static, the board of directors has appointed a Program Evaluation Committee under the chairmanship of C. E. Grigsby, American Steel Foundries, Chicago, to survey again the aims and objectives of the society to determine the direction of future programs.

The National Policy Information Committee was organized during the year under the chairmanship of J. Keith Louden, Lebanon Steel Foundry, Lebanon, Pa., to encourage members to participate in politics and governmental affairs at all levels and to keep members informed of government action and pending legislation which will affect the steel foundry business. The first of a series of government relations bulletins will be distributed soon and will apprise members of the areas requiring attention.

New Handbook Available

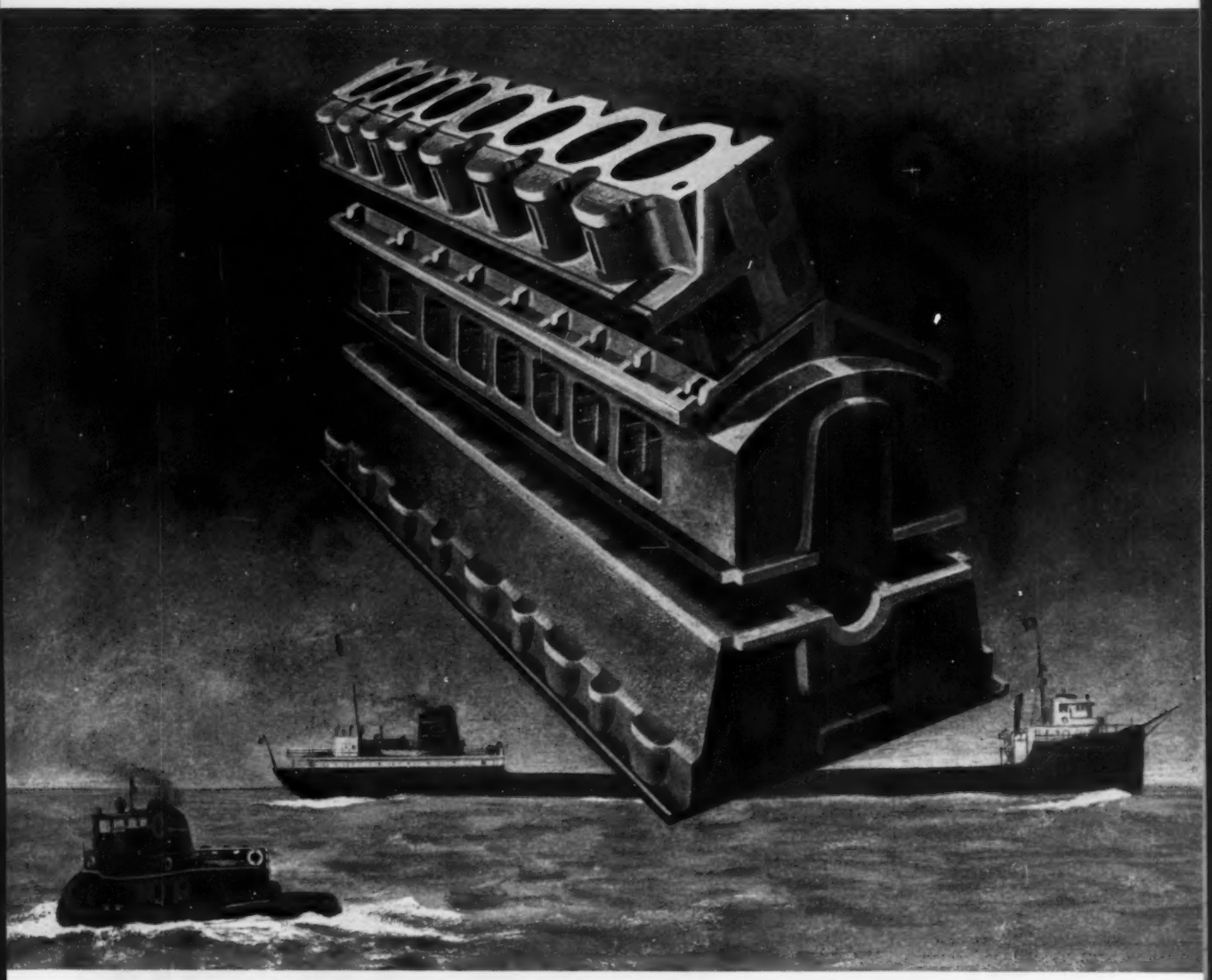
Mr. Moriarty reported briefly on the completely new handbook which will be available shortly, and he paid tribute to the staff and committee members who have spent much time and effort to complete the project.

Reporting on the regular activities, the president stated that the Management Accounting Program Committee, under the chairmanship of H. L. McClees, Crucible Steel Castings Co., Lansdowne, Pa., has issued 16 Management Controls bulletins and expects to distribute 10 more during the next 1½ years. A new publication, *Steel Foundry Controls for Management*, will be issued soon and will include articles on accounting by members and others.

The Statistical Reports Commit-

H. A. Forsberg, left, Blaw-Knox Co., Foundry & Mill Machinery Div., East Chicago Works, receives award from SFSA President Moriarty in recognition of the company's outstanding accident prevention work

How the Foundry Industry Serves America . . . #5 of a Series



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The excellent vibration damping characteristics of gray iron assure the lowest possible noise level. The rigidity and mass which is easily designed into a casting contributes to permanent alignment. Gray iron gives good engine heat distribution. The inherent stability of gray iron eliminates need for stress relieving. And because of the large amount of drilling and tapping required, the easy machinability of gray iron is an important advantage. All of these qualities were taken into consideration before the specifications were changed from steel weldment to gray iron casting.

For the production of structurally sound iron castings, Hanna Furnace provides foundries with all regular grades of pig iron . . . foundry, malleable, Bessemer, intermediate low phosphorus, as well as HANNA-TITE® and Hanna Silvery.

Facts from files of Gray Iron Founders' Society, Inc.

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Buffalo • Detroit • New York • Philadelphia

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Circle 656 on Page 55

tee, under the chairmanship of H. L. Holtz, Sivyer Steel Casting Co., Milwaukee, is working constantly to improve reports sent to members. Emphasis is placed on accuracy of reporting, making reports meaningful to members, and reporting promptly only useful information.

In the field of technical research, 40 projects have been completed and nine are in process. Since 1944, the SFSA has spent $1 million in research. The Technical Research Committee, under the chairmanship of V. E. Zang, Unitcast Corp., Toledo, Ohio, is recommending numerous new studies that will improve both the processes and products of the industry. The Specifications Committee, of which R. H. Frank, Bonney-Floyd Co., Columbus, Ohio, is chairman, has developed six raw material specifications and is at work on the seventh.

The 1960 Technical and Operating Conference will be held in Cleveland, Nov. 14-16, under the chairmanship of Dale L. Hall, Oklahoma Steel Castings Co., division of American Steel & Pump Co., Tulsa, Okla. The president had high praise for these conferences.

Lower Accident Rate

The steel castings industry has a better accident record than other foundry groups or other foundries as a whole, according to Mr. Moriarty. Since 1940, the frequency record of the industry has improved from 40 lost-time injuries per million man hours of exposure to 18.3 in 1959. The rate for the first seven months of 1960 is 16.4.

Credit is due, over the years, to the society's Safety Committee, which at present is under the chairmanship of J. D. Holtzapple, Blaw-Knox Co., Pittsburgh. The committee strives constantly for new approaches to safety consciousness by all members. It recently made a study to determine the member company with the best accident prevention program, and the award went to Blaw-Knox Co., Foundry & Mill Machinery Div., East Chicago Works, East Chicago, Ind.

The president urged use of the materials provided by the Market Research Committee, under the chairmanship of Allen M. Slichter, Pelton Steel Casting Co., Milwaukee, including the 12 Market Research Reports which have been issued. He referred to the new Product Development Contest being arranged by the Product & Market Development Committee, with James A. Bray, Mackintosh-Hemphill Div., E. W. Bliss Co., Pittsburgh, as chairman, and he pointed out that the regional product and market development meetings, which proved successful last year, are being repeated.

To conclude his report on committee activities, Mr. Moriarty described the enlarged program of the Advertising & Public Relations Committee, under the chairmanship of Marion J. Allen, American Steel Foundries, Chicago. One of the big activities of the committee concerns the steel castings centennial celebration in 1961.

J. A. Bray announced the Centennial Product Development Contest and indicated a change in entry classes. This year the contest is limited to individuals or groups in engineering or industrial or research organizations who are either present or potential users of castings or full-time students through the graduate level. The contest closes June 1, 1961, and 110 cash awards total $10,000.

W. W. Heimberger, Buckeye Steel Castings Co., Columbus, Ohio, chairman of the Handbook Committee, reported that the third edition of the handbook now is on the press and should be available shortly. The handbook has been entirely rewritten and rearranged. It has 19 chapters and 220 additional illustrations and is 10 per cent larger than the 1950 edition.

Foundry Course Sponsored by University and AFS Chapter

A four-semester course of foundry instruction, offered by Purdue University in co-operation with the Central Indiana Chapter of the American Foundrymen's Society, started Sept. 22 at the Purdue Marott Center, Indianapolis. The program consists of four courses of foundry practice and application and four courses of allied subjects. Classes will be held one night a week for 48 weeks. There will also be three Saturday field trips each semester to the Purdue campus to use the school's foundry for practical application work.

In the interest of the American foundry industry, this ad (see opposite page) will also appear in

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Circle 657 on Page 55

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Circle 658 on Page 55

Around the Country

NEWS REPORTS FROM

Detroit . . . Cleveland . . . Philadelphia . . . Chicago . . . Pittsburgh

Philadelphia— Fall has brought little new life to the castings market. Gray iron job shops doubt if October business exceeded 60 per cent of normal capacity, or about on a par with the revised estimate for September.

Despite this lag, foundrymen generally look for some improvement before the year-end. Casting buyers have worked off excess inventories and should be specifying more actively soon even if end-use demand is no more than sustained. Should there be an increase in this latter demand, as some think will be the case, so much the better.

There is no question, however, that business is well short of earlier expectations. Industrial expansion programs are not going ahead as planned, and defense work is slow to improve. Demand for construction specialties is fair but is below the expected level.

Gray iron jobbing operations average three to four days a week, mostly with limited working forces. One large producer estimates that his regular trade is taking about 50 per cent of normal tonnage. Backlogs range from one to two weeks. Auto die work is developing slowly, and producers specializing in such items as manhole covers, water boxes and drain inlets continue rather busy.

Steel foundries are operating about 60-65 per cent, averaging four days a week. One shop, operating five days, is on a six-hour daily schedule. Backlogs are small.

Following a good first half, malleable shops experienced a lag which brought them into October with only slightly better operations than in midsummer. They are averaging four days a week and promising deliveries within two weeks. Miscellaneous hardware is holding up fairly well, but over-all business is spotty.

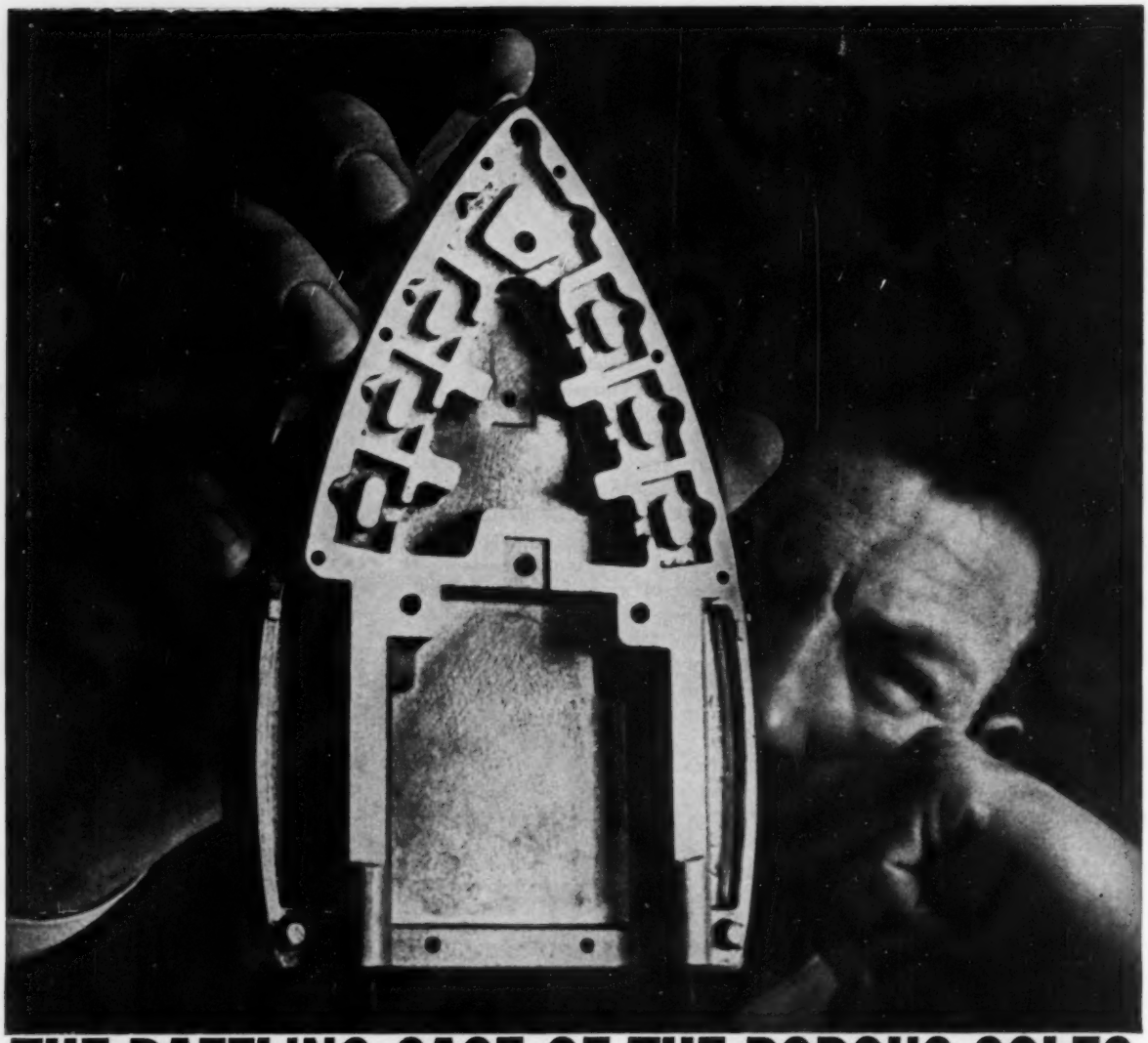
Brass and bronze demand is sluggish. Some independent plants are closed and some captive shops are doing no better than two to three days a week. The latter includes producers of industrial valves and pumps and at least one meter manufacturer. Red metal shops in general are estimated as doing little better than 40 to 45 per cent. Aluminum foundries are more active than the brass plants, but are having to scramble for tonnage.

CASTING DEMONSTRATION: A demonstration of aluminum sand casting was sponsored by Northeastern Ohio Chapter of the American Foundrymen's Society at Geauga County (Ohio) Historical Society's exhibition last summer. Shown here is P. W. Stafford, mayor of Burton, Ohio, pouring a casting under the guidance of A. H. Hinton, sand foundry manager, Aluminum Co. of America, Cleveland, Ohio. Alcoa furnished the equipment for the demonstration

Pittsburgh—In the past month, foundry operations have gone from bad to worse. Hopes for an upturn are fading as the steel industry—biggest customer for castings in this market—continues to limp along at less than 60 per cent of capacity.

Purchasing men at the mills are under orders to keep their buying at a minimum. As a consequence, they're ordering on short notice and forcing foundries to carry inventory for them. "The mills won't stock anything," a nonferrous foundry complains. "They expect us to have bearings on the shelf, machined and ready to go whenever they decide to order a few. We can't afford to tie up our money that way, but it's the only way we can sell."

At most foundries, incoming orders hit a low for the year in September and continued to decline in early October. Backlogs are nil, inquiries are few, and prices are being cut indiscriminately. Steel and



THE BAFFLING CASE OF THE POROUS SOLES

Another costly mystery—solved by the man from Kaiser Aluminum

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HOW THE CASE WAS SOLVED. A phone call was made. The man from Kaiser Aluminum came and put his finger on the problem: shrinkage porosity (caused by improper feeding of the casting). The solution was quickly reached by (1) readjusting thermal properties in the die, (2) by varying the die coatings, and (3) altering the gating system to allow proper feeding of the casting.

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Circle 659 on Page 55

gray iron shops are living from one mail delivery to the next. Few can tell in advance whether next week's business will permit them to work two days or four. In general, operations average about 40 per cent of capacity.

Although none of the markets for steel castings can be described as "good," sales to forging machine manufacturers and hydroelectric power plants are the best of the lot. Railroad business is almost nonexistent. Hydraulic press manufacturers may not be dead—as one foundryman opined — but they're certainly out of the market. Suppliers to the electrical industry are bracing themselves for more trouble —nationwide strikes against General Electric Co. and Westinghouse Electric Corp. that could disrupt shipments for months.

Roll manufacturers had better shipments in October than in August or September—but only because their customers released some old orders. Having lived off their inventories for months, the mills started once again to gear their purchases to current consumption. Although September was better than July or August from a new order standpoint, the improvement was slight. October started badly — a tipoff, possibly, that steelmakers don't expect much improvement in their operations during the fourth quarter.

Chicago—September saw the end to an unusually long strike which had closed down a steel foundry in this area for 8½ months. Settlement of the 257-day strike of 500 employees of the American Manganese Steel Div., American Brake Shoe Co., Chicago Heights, Ill., was announced Sept. 19.

The strike was called last Jan. 6 by Local 1136 of the United Steelworkers in a contract dispute, shutting down the plant.

The new contract provides for modification of "past practice" clauses, giving the company as well as the employees the right in labor disputes to assert other provisions of the labor contract. Previously, these work activities had been covered only by broad language. The company insisted on the new clause for efficiency of plant operations.

The new three-year contract, which runs until Sept. 1, 1963, provides for wage increases effective Sept. 18, 1961, and Sept. 18, 1962, a revision of the incentive system, and adoption of a company-wide pension and insurance plan. The package is reported to average 41 cents an hour.

Cleveland— Some details of the Dwight-Lloyd McWane process for making iron were disclosed here recently. Instead of the usual coke-fired blast furnace, the process employs a sintering machine, electric furnace, and grinding and pelletizing equipment.

Initial research on the process, which has been in development for almost 12 years, was sponsored by the McWane Cast Iron Pipe Co., Birmingham. Later McWane was joined in the project by the Dwight-Lloyd Div., McDowell Co. Inc., Cleveland.

The process involves coarse grinding of iron ore, noncoking steam coal, and limestone. These materials, suitably proportioned to give the desired final iron composition, are intimately mixed and wet ground to fine size in a ball mill. The mixture, after being dewatered in a continuous filter, is formed into pellets about ½ in. in diam.

The moist pellets are distributed onto the traveling grates of a Dwight-Lloyd sintering machine where they first are dried and then ignited. Ignition results in a substantial reduction of the ore to metallic iron. Emerging from the sintering machine at about 1500° F, the hot pellets are charged into a submerged-arc electric furnace. There the reduction of the remaining ore to metallic iron is completed and, with the slag, the iron is converted into liquid form.

This process is expected to interest firms requiring about 500 tons of iron a day, but it is said to provide a profitable operation at 200 tons a day. Indications are that a 500-ton plant will cost $6-7 million to build, but the investment per ton of capacity is placed at about one-half that of a modern, conventional ironmaking plant.

To make a net ton of pig iron the process requires 1.6 tons ore fines, 0.9 ton steam coal, 0.4 ton flux, 10 lb electrodes, 800 to 900 kwh power for the furnace, 62 kwh for remainder of the plant, 1.1 man-hours production labor, and $1.50

for maintenance. Depending on location and material costs, total production cost is $35 to $45 a ton of iron.

Advantages claimed for the process are use of low-cost materials, capability of intermittent operation if required, and elimination of special or intricate equipment.

Detroit—Five 1961 model automobiles are equipped with an aluminum engine or offer one as optional equipment. A strong possibility exists that four additional autos will have aluminum engines before the model year is finished. Only four basic engines are involved in these nine automobiles.

The Buick Special, Oldsmobile F-85, and Pontiac Tempest use the same basic V-8 engine. A straight six cylinder block is used in the Rambler. The Corvair uses an opposed six cylinder engine. In all probability the engine to be available later this year for the Plymouth, Valiant, Dart, and Lancer will use a die cast slant six block.

All of these engines have one thing in common. Cast gray iron cylinder liners are used, or, in the case of the Corvair, the complete independent cylinders are cast gray iron. Because manufacturers of aluminum engines consider the use of gray iron essential in cylinder walls other manufacturers see advantages in developing, farther, the complete gray iron block.

Ford Motor Co., for example, is developing a new gray iron V-8 block for a compact car engine having a few more horsepower than the Falcon six cylinder engine. The weight goal for the new block is 116 lb, which compares with 112 lb for the Falcon block before machining. A weight of 120 lb has been achieved in pilot models of the new V-8.

Present plans are that the new block will be cast in green sand with cores bonded either by phenolic resin or by a furfuryl alcohol-urea resin system. The castings will be made on a new, highly automated production line. Cores will be made along the line and set in the molds mechanically.

Development of this new engine, like that of the Falcon engine, is based on extreme design simplification, precise engineering, and close production and quality control on every component. Part of the weight reduction in the new block, for instance, will be achieved by reducing casting wall sections in some areas to 1/10 in. Consideration is being given to the use of nodular iron to insure adequate feeding of the thin-wall block.

Special Alloy

PROVIDES LONGER LIFE–NO HOT SPOTS

Acme melting pots and ingot molds assure even heat distribution without hot spots . . . they improve non-ferrous casting quality and put a damper on rejects. Cast of a specially developed iron alloy, Acme pots and molds provide great strength and unusual resistance to high temperatures, too. As a result they consistently reduce down time and substantially cut replacement costs.

Stocked in forty sizes and a complete range of styles, you can standardize on Acme melting pots and molds and be confident of immediate shipment at all times! Take advantage of all these benefits . . . proven over a period of more than 30 years.

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"Boss, you've just got to hire another man"

METALGRAMS

UNION CARBIDE METALS

. . . news about "Electromet" ferroalloys and metals

NOVEMBER, 1960

LOWER COSTS FOR STAINLESS STEEL -- Stainless foundrymen are making big savings by using ferromanganese-silicon for finishing additions of silicon and manganese. Assuming 100 per cent recovery, $2.86 per ton can be saved for a 1 per cent manganese and accompanying 0.45 per cent silicon addition. The alloys replaced are electrolytic manganese and ferrosilicon. Several foundries also report getting cleaner steel when using ferromanganese-silicon. Write for F-20,093 for further information.

* * *

EFFICIENT PRODUCTION OF HIGH-CARBON IRON -- A low-silicon pig iron contains more carbon than a high-silicon pig. Thus, low-silicon pig is widely used by iron foundries producing high-carbon cast iron for castings requiring excellent machinability and freedom from internal shrinkage defects. Additional silicon can be conveniently added to the cupola as "EM" silicon briquets. Ask your Union Carbide Metals representative about this economical practice. For briquet specifications, write for F-20,066.

* * *

BUILDING BIGGER MARKETS -- "Your man's practically a member of my staff," a president of a steel firm said of one of UCM's market development specialists. These men work with steel producers to develop new markets and expand old ones. Primarily, they promote the use of stainless steel and titanium (including castings) in transportation, architecture, process industries, and consumer goods. More details can be obtained by writing for the article, "Men, Metals, and Markets," in the Spring 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

SILICON IMPROVES ALUMINUM CASTINGS -- Almost all aluminum castings contain silicon. The element improves castability, allowing adequate filling of thin sections and complex shapes. It also lowers the coefficient of thermal expansion and reduces hot shortness and cracking. A choice of six grades of "Electromet" silicon metal are available for additions to aluminum casting alloys. For more silicon data plus how the auto industry uses silicon in castings, write for the article, "Aluminum Auto Castings Grow," in the Fall 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

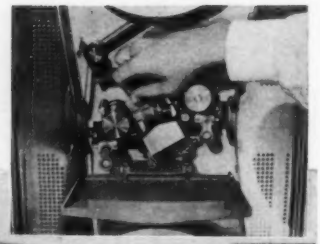
AN EFFICIENT BLOCK -- Why is silicomanganese the most popular blocking alloy in the steel industry? The alloy dissolves rapidly, giving faster blocks and shorter blocking times. It allows higher recoveries and closer control of manganese and chromium added to the furnace. It also improves steel cleanliness. Silicomanganese also may be used for low-cost ladle additions. For further information, write for the article, "Silicomanganese Improves Blocking Performance," in the Fall 1960 issue of UNION CARBIDE METALS REVIEW.

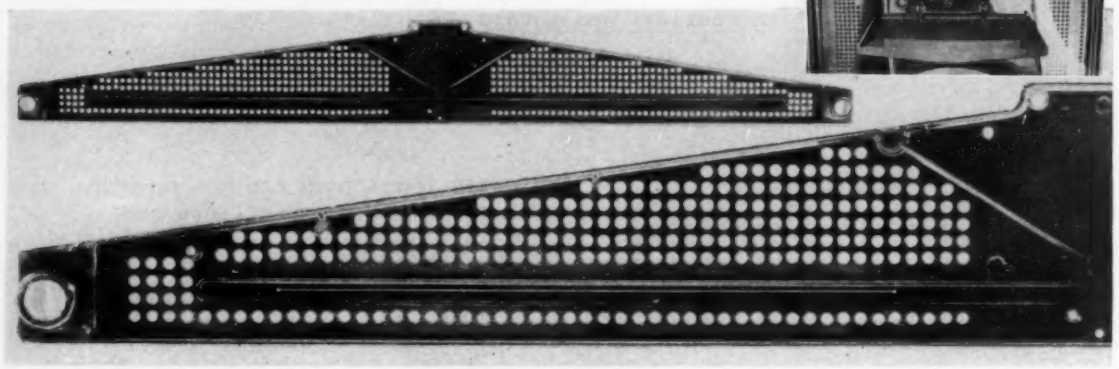
* * *

UNION CARBIDE METALS COMPANY, Division of Union Carbide Corporation, 270 Park Ave., New York 17, N. Y. In Canada: Union Carbide Canada Ltd., Toronto.

"Electromet," "EM," and "Union Carbide" are registered trade marks of Union Carbide Corporation.

Top winner is a diecasting used as vacuum chamber in digital tape handler for computers, shown below. Chamber sensing slot in view at right, between single row of cored holes and larger group, maintains the tape loop at proper length and tension





Computer Component Is

ZINC DIECASTING OF YEAR

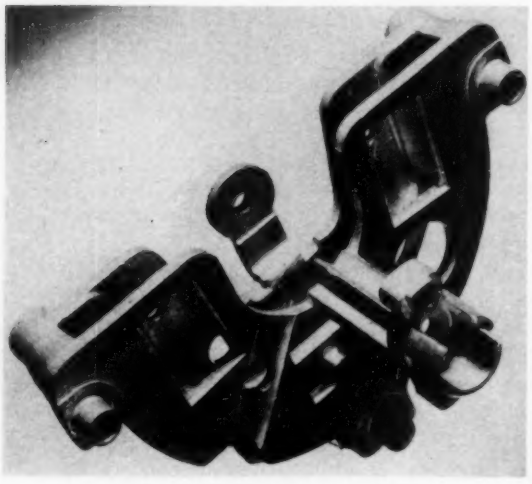
● WINNER OF THE $1000 grand prize in the "Zinc Diecasting of the Year" contest sponsored by New Jersey Zinc Co., New York, is Victor O. Anderson, A & A Die Casting Co., Gardena, Calif. Mr. Anderson's winning casting is the vacuum chamber for an Ampex digital tape handler for computers.

Conducted by New Jersey Zinc as a means of recognizing the unsung talents of the diecasting engineer, the contest was the first of its kind and produced a wide range of entries which demonstrated the skill and ingenuity of their designers and producers.

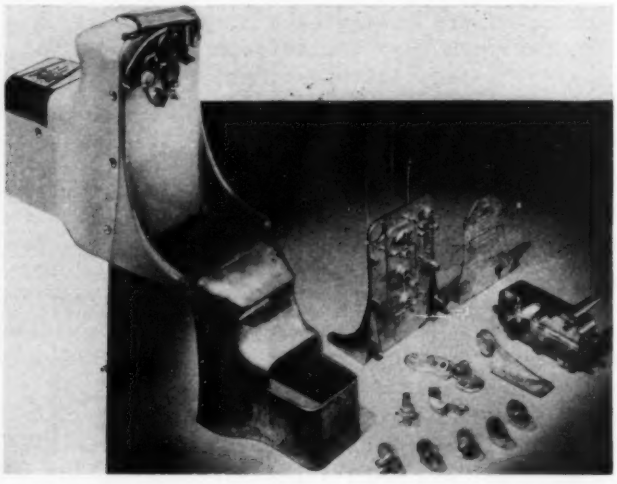
Mr. Anderson's prizewinning zinc diecasting, the replacement for a part machined from aluminum bar stock, contains a total of 515 cored holes. It is 32 in. long, 3¼ in. wide, and 1½ in. deep, and wall thicknesses vary from 0.025 in. to a maximum of 0.175 in. Two 0.007-in. slots which between them run almost the length of the part are cast within 0.020 in. of the surface before milling. The casting represents a 95 per cent saving over the machined component it replaces.

Presentation to Mr. Anderson of his prize was made Sept. 14 at the

Extreme dimensional accuracy won merit award for ammeter and voltmeter mounting frame



Use of maximum number of diecast components won merit award for this electric can opener and knife sharpener



New from Wright!

Built-In Overload Protection for Operator, Load and Hoist with the New Wright Overload Cutoff*!

• Now, for the first time on any electric hoist, you can have safe, sure, mechanical overload protection as a built-in feature with the **WRIGHT Overload Cutoff.** Designed and built to fit any new WRIGHT *Speedway* Electric Hoist, the Overload Cutoff unit you see pictured above is a compact, integral part of the hoist frame itself. As a result, it becomes a functional part of the hoist *at no sacrifice in headroom.* The WRIGHT Overload Cutoff is simple in design and should give dependable, trouble-free operation during the entire life of the hoist under normal operating conditions. Calibrated and sealed at the factory for the user's protection, the unit takes rugged abuse up to the critical point of overload—then instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is done, the raising circuit of the hoist is again automatically restored.

The WRIGHT Overload Cutoff is available now as standard equipment on all new WRIGHT Frame 2 & 3 *Speedway* Electric Hoists, and as optional equipment on new Frame 1 & 1½ models.

Find out how WRIGHT *Speedway* Hoists equipped with Overload Cutoff can bring practical, fast-acting overload protection to your material handling operations. For complete information, write our York, Pa., office.

*Patent applied for

See your WRIGHT Distributor *about the Speedway Electric Hoist line or write us for Catalog E-58*

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ACCO

Circle 661 on Page 55

AUTOMATE your melt analyses with a

B-A DIRECT-READING SPECTROMETER

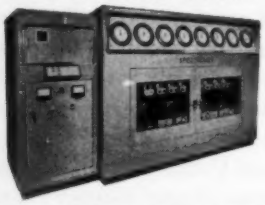
Chemical Composition In Minutes

Baird-Atomic Spectrometers — either the SPECTROMET® or DIRECT READER — allow high precision analysis of alloying and minor elements to be made quickly and easily. Results are reported to the melt shop in minutes permitting corrections to be made prior to pouring. Both units are specially designed for rugged, practical use . . . to be operated by semi- or non-technical personnel.

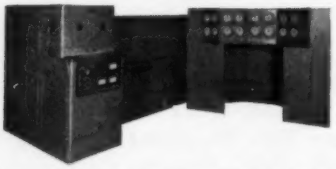
SAVE TIME, ELIMINATE WASTE, HIT SPECS ON THE NOSE

- Eliminate "off analysis" heats.
- Shorten furnace holding time — net more heats per month, minimum loss of alloy elements, longer furnace life, lower fuel costs.
- Conserve expensive alloying elements by confidently aiming at low side of the specification. Detect harmful tramp elements.
- Reduce expenses by saving manpower, supplies, and space.

Choose the Model Suited to Your Needs



SPECTROMET — rugged model designed for installation close to the melt shop without need for special laboratory. Analyzes up to fourteen elements.



DIRECT READER — Custom-built laboratory unit analyzes for up to 60 elements or more — dial or strip chart readout.

BOTH UNITS HAVE THESE EXCLUSIVE B-A ADVANTAGES

- Automatic Optical Servo Monitor — maintains optical alignment regardless of temperature, atmospheric pressure or shock and vibration.
- Simultaneous Results with Parallel Interchangeable Channels — essentially a separate direct reader for each element. Increases reliability, facilitates maintenance. If one channel fails, other channels not affected. Channels interchangeable without recalibration.
- Wide concentration range on single scale — exclusive logarithmic presentation of results covers wide concentration range on one scale without sacrifice in precision (e.g. from .1% to 40% chromium in steel).
- High Resolution and Dispersion with 3-Meter Grating — high dispersion of grating in combination with Automatic Optical Servo Monitor aids performance. For example: phosphorus in steel in presence of copper, boron in steel, silicon in steel in presence of high chromium.
- Custom Built Excitation Source — the source best suited to each problem is custom built into the instrument.

Write for Introductory Bulletin SC-1.

B-A BAIRD-ATOMIC, INC.

33 university road · cambridge 38, mass.

annual meeting of the American Die Casting Institute, in Chicago, by R. C. Kenly, vice president, New Jersey Zinc Co. Mr. Anderson turned his $1000 prize over to the scholarship fund of the Die Casting Research Foundation, the research arm of the ADCI.

Awards of Merit—Nine awards of merit also were made by the judges, who were Ralph G. Dermott, *Metal Progress;* Norman E. Kewley, General Electric Co.; and J. H. Schaum, *Modern Castings.* They included the following:

Thomas F. Groden, Serv-All Die & Tool Co., Crystal Lake, Ill.—unique die design for a television tuner housing.

Robert C. Cornell, Litemetal Diecast Inc., Jackson, Mich.—excellent utilization of the fabricating properties of zinc in an intricate automobile heater outlet.

Trevor Davis, Twin City Die Casting Co., Minneapolis—excellent application of the special properties of both the material and the process in a ferrule clincher for polyethylene tubing.

H. C. Kisiel, Kisiel Die Casting Works, Batavia, N. Y.—two extremely thin-walled castings which typify what can be accomplished in the way of lightweight but complex construction.

Paul E. Berndt, Westland Die Casting Inc., Glendale, Calif.—unusual use of the ductility of zinc alloy in blanking and forming operations on a blower housing for an air-conditioned helmet.

Roger M. Myrick, Union Die Casting Co., Whittier, Calif.—use of the maximum number of zinc diecasting components in a complex assembly comprising a combination electric can opener and knife sharpener.

George A. Meyer, Dollin Corp., Irvington, N. J.—outstanding example of a cored miniature diecasting in the form of a tube coupling used for hearing aids built into eye glasses.

Fred Wells, Peasley Products Inc., Stratford, Conn.—handling of extreme dimensional accuracy requirements in a complex mounting frame for an ammeter and voltmeter.

Harry C. Whitehead, Whitehead Die Casting Co., Atlanta—bobbin holder, for outstanding cost reduction in a high-volume item.

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Whiting engineering integrity demands meticulous preliminary planning, insists on pre-installation testing, zealously oversees every phase of installation. Whiting engineers make post-installation checks, too, assuring the continuous quality and control of production that has made "Whiting" synonymous with profitable, trouble-free operation.

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GET THE FULL STORY! If you would like illustrated technical information on the many types of *MECHANICAL CHARGING SYSTEMS* engineered by Whiting, just write for Bulletin FY-179. *Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois. In Canada: Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.*

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FOR YOUR FOUNDRY...

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COST-CUTTING

CORE & MOLD WASH...

DESIGNED EXPRESSLY TO:-

1. SPEED PRODUCTION OF FINER-FINISH CASTINGS

2. CUT CLEANING ROOM COSTS

3. REDUCE SCRAP & REJECT CASTINGS TO A MINIMUM

4. LOWER PRODUCTION COSTS

5. GIVE CORES & MOLDS BETTER DIMENSIONAL STABILITY

Working samples, together with literature on Delta Core and Mold Washes, will be sent to you on request. Tell us the kind of castings you make — steel, gray iron, malleable, non-ferrous — and such other information as you care to add. If you have a particular problem, tell us about it. Delta foundry technicians are qualified to recommend Delta Foundry Products for specific applications in all types of foundries.

All Delta Core and Mold Washes are quality controlled ... your assurance of uniform results at all times.

OUR 27TH YEAR

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GOOD TO THE CORE

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MANUFACTURERS OF
SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

Opening ceremony is shown here with G. L. Guyer, president of the organizing committee, giving an address to the Congress. Official USA delegate at the bottom right is Frank J. Dost

Technical Sessions Popular at

International Foundry Congress

By M. M. HALLETT

Managing Director
Chamberlin & Hill Ltd., Walsall, England
European Editor, Foundry

● THE SWISS conducted a notably well organized International Foundry Conference on Sept. 19-24 under the chairmanship of G. L. Guyer, president of the organizing committee, and F. W. E. Spies of Holland, president of the International Committee of Foundry Technical Associations.

In beautiful surroundings at Zurich and in fairly good weather, general satisfaction was expressed with results of this 27th Congress.

Attendance at technical sessions was so high (probably because of the good time in which the papers were sent to delegates) that the meeting rooms were packed. Unfortunately, many authors overran the time allotted for reading the papers and left little opportunity for discussion.

Outstanding features on the social side were an admirably produced review of Swiss folk lore and an opportunity for delegates and their ladies to participate in an all-day outing on Lake Lucerne.

At the opening ceremony, in addition to speeches by Mr. Guyer and Mr. Spies, the welcome of the Swiss government was expressed by Dr. M. Holzer, head of the Federal Office for Industry, Crafts, and Labor. The Award of Honor was presented to Dr. A. Collaud of the Von Roll Organization for his outstanding work on the mechanical properties of gray cast iron.

The vice presidency of the International Committee for 1961 was allotted to Belgium, but the name to be submitted was not announced. It was also decided that, following the 1962 conference in Detroit, the 1963 conference would be held in Prague, in 1964 in Holland and in 1965 in Poland.

Foundry Dictionary—The International Foundry Dictionary Committee reported that the French committee has concluded the choice and definition of the terms to be included and that most of the national committees have practically completed the work of translation. A resolution regarding the financing of publication was adopted.

Steady progress was reported by other committees, including that on testing cast iron as well as committees on foundry clay, coke, founding properties of metals, and the standardization of methods of testing materials used in the CO_2 process. A new committee on malleable cast iron was authorized.

The Swiss secretary Dr. Muller and the honorary secretary treasurer Vuilleumier were re-elected.

Twenty-three technical papers were presented of which three were in French, six in English, and the remainder in German.

Gray Iron Matrix—A. Collaud (Switzerland—written in French) presented a paper on the appraisal of gray cast iron with special reference to its matrix structure as a summary of his extensive work carried out for several years. Last year Patterson introduced some new terms to define the characteristics of gray iron—degree of normality, relative hardness and quality index. Collaud showed their relationship to the formulae developed earlier by him and illustrated a considerable number of mechanical property determinations in connection with these indices and the relationships worked out by Patterson, by MacKenzie, and by de Sy.

Inoculation was shown to improve the quality index because it increases the tensile strength with-

out much effect on Brinell hardness. Since hardness is controlled mainly by the form of the matrix, a series of irons was annealed between 500 and 750° C (932 to 1382° F) and the mechanical properties determined. With increasing annealing temperatures, the quality index tended to decrease and the shock resistance to increase. From these results two hypoeutectic irons were produced free from impurities, one unalloyed and one alloyed with nickel and molybdenum which could show a high index of quality or high shock resistance.

Mechanical Properties—J. S. Abcouwer (Holland—written in German) developed another mathematical approach to the definition of gray iron properties. Since the heat flow (and thus speed of cooling and mechanical properties) depend on the volume/surface area ratio, all simple compact castings have coincident cooling curves; consequently the mechanical properties can be predicted for different section thicknesses.

Using relationships established by Collaud and others enables the properties of simple castings to be predicted, and a standardized set of values for various section thicknesses in a range of gray irons is proposed. For complicated castings, the Dubi relationship with Brinell hardness should be used.

Rapid Cooling—I. Minkoff and A. Goldis (Israel—written in English) reported on structures observed in very rapidly cooled irons. To obtain these conditions a jet of water was impinged on a falling stream of molten metal; this caused shot formation, and the smaller the shot the higher the speed of solidification. In hypereutectic iron, the structure of large shot showed normal kish graphite, but at higher speeds of solidification the graphite became progressively more nodular, and from the appearance of the surrounding austenite seemed to form direct from the melt.

It is suggested that this condition is due to increased undercooling and consequently greater probability of nucleation of new faces. A nickel-carbon series showed similar changes but hypoeutectic iron merely turned white and exhibited no nodular graphite.

Cementite Decomposition — R. Mitsche (Austria—written in German) presented an extensively illustrated paper on the decomposition of cementite. After considering the confusing effects of impurities and other heterogeneities in arriving at clear results, he described experiments on specially purified high-carbon iron which was melted with various degrees of superheat, with and without silicon inoculation and then cast either into 1¼-in. bars or into very fine shot, using a rotary sampling machine.

The specimens so prepared then were heated in various ways close below the solidus temperature. Many observations were made with qualifications, but only two definite conclusions: 1. True spheroids did not appear at all. 2. Fine flake graphite did not form from cementite.

Further work was performed on direct observation of graphite forming on flat surfaces of white iron heated in vacuo, using a high-temperature microscope, the technique of which has been improved. This showed nodular graphite forming in the austenite dendrites or at their edges, but not in the cementite.

It is suggested that there is a great difference in surface and interior phenomena because of the high pressure which must be set up in the interior when graphite forms. If these surface-formed spheroids then are reheated above the solidus, the regions remote from the spheroids melt and on cooling revert to white iron, giving a heat etching effect.

Heat Flow—Another rather theoretical paper was presented by W. Patterson and W. Koppe (Germany —written in German) on heat flow from the casting to the mold during solidification and cooling to room temperature. A mathematical analysis showed that straight-line plots can be obtained between time and the square of the volume/surface area ratio, not only for solidification but for subsequent transformations and for reaching other stated temperatures. This indicates that Chvorinov's rule can be applied throughout the cooling of a casting.

This conclusion was checked experimentally with square and round cast iron bars and on flat plates by using the change in temperature per unit time. A method was developed for calculating cooling curves in infinite plates which could be extended to simple castings. Further experiments showed that in cast iron the solidification time is highly dependent on graphite quantity and carbon content, but this dependence decreases at lower temperatures and is negligible at the eutectoid point.

Grain Structure — Factors controlling the production of fine grain in cast metals were critically analyzed by G. W. Form, G. K. Turnbull, G. Gould, H. Merchant and J. F. Wallace (U.S.A.—written in English). Since the formation of crystal grains from the melt is a process controlled by nucleation and growth, fine grain size will occur with a high degree of nucleation and a low or interrupted rate of growth.

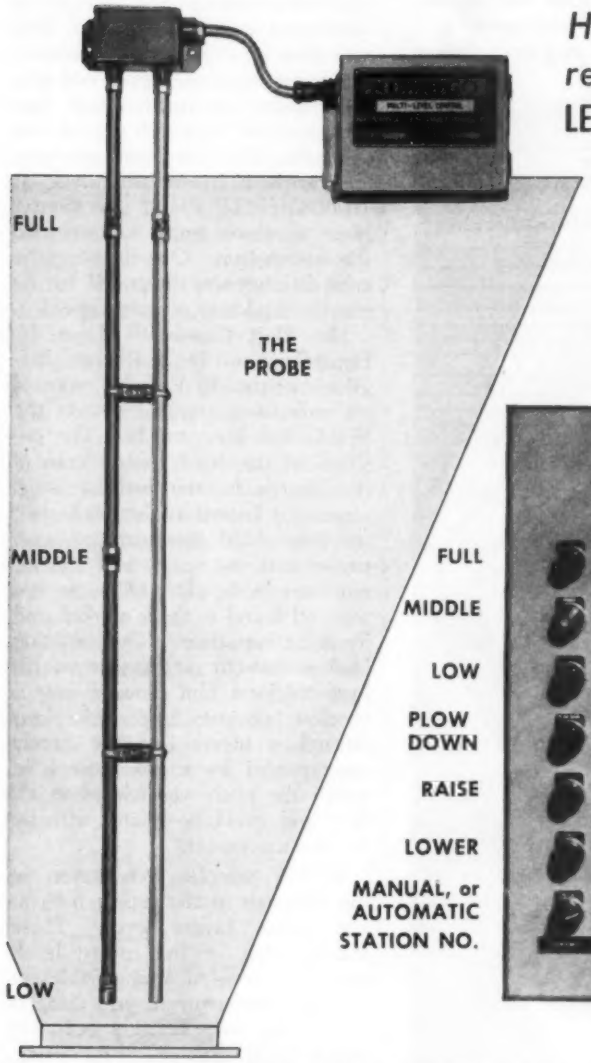
Among the means of achieving this aim is mechanical vibration when the alternating pressure waves

Delegates attending the Foundry Dictionary Committee meeting are (from left) Dr. A. B. Everest, England, and W. W. Maloney and F. J. Dost, USA

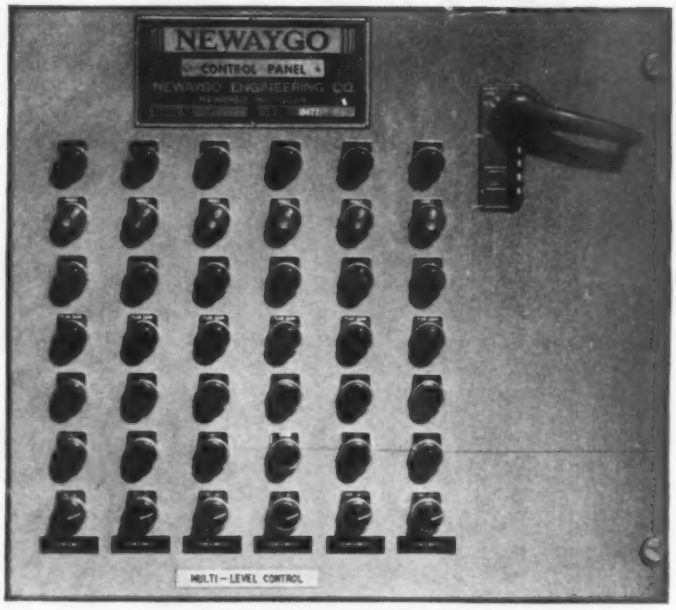
Newaygo's New MULTI-LEVEL CONTROL

ASSURES CONTINUOUS SUPPLY OF SAND TO MOLDERS BY AUTOMATIC SAND DISTRIBUTION

Here is the "heart" of this system for reporting and controlling **3 OR MORE LEVELS OF SAND** *in hoppers or bins.*



THE CONTROL PANEL



This new, improved system of MULTI-LEVEL CONTROL, by a Probe in each hopper, reports and controls 3 or more levels of sand automatically. This Multi-Level Control operates the hopper plows automatically or manually for any or all stations as required, which is another unique feature of this system. The mixer man can tell depth of sand in hoppers instantly, and control it automatically, eliminating another man to watch and report levels to him. This additional unique feature of the new Multi-Level Control is that special mixes for any one station can be controlled manually by the mixer operator, independent of other stations, which remain on automatic setting. *Write, wire or phone for complete details of this newest Newaygo-designed Multi-level Control system.*

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Do you receive "SAND SCRIPTS"? Write us, if you want to receive this Newaygo Magazine.

Circle 665 on Page 55

raise the freezing temperature locally and hence increase the degree of undercooling. The higher rate of nucleation can be accompanied by interruption of grain growth, particularly at low pouring temperatures in alloys with a wide freezing range under conditions of rapid heat abstraction.

The predictions regarding mechanical vibration were confirmed by applying both sonic and ultrasonic vibration to small solidifying ingots of aluminum-base alloys, with copper, and on yellow brass.

Further work was carried out on the inoculation of copper, steel, and gray iron. On copper, the additions could be classified either as inoculants or as inhibitors of grain growth and some produced marked refinement. Some similar work on ferritic steels pointed to titanium carbide and zirconium carbide as effective refiners. Unfortunately, the higher strength was accompanied by greater brittleness.

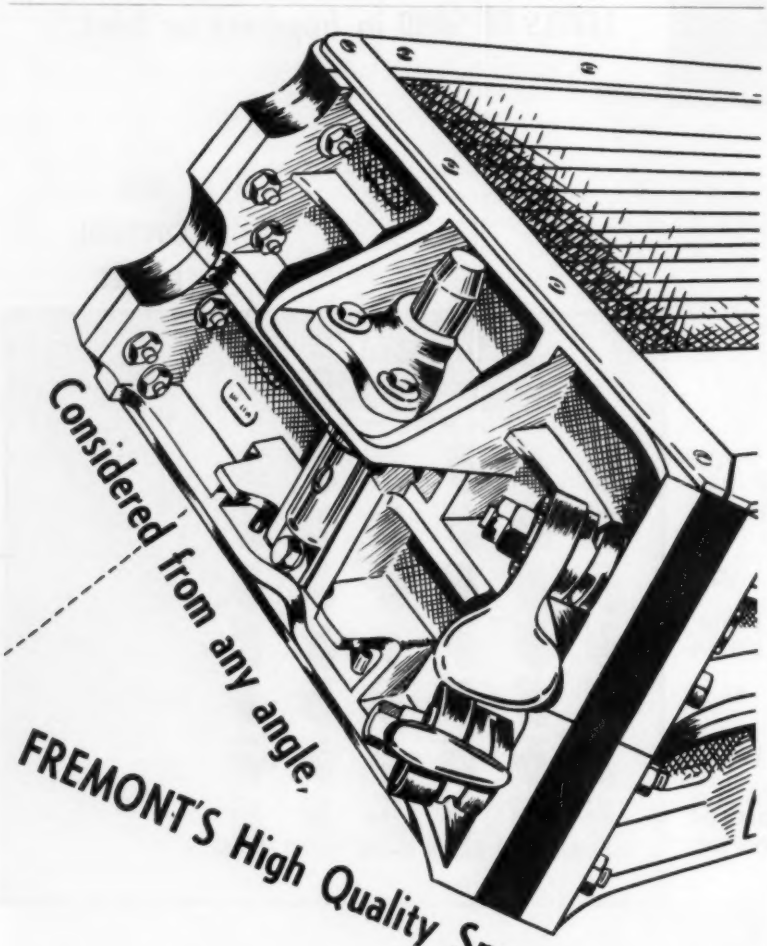
Work on gray cast iron showed the importance of aluminum as a constituent of inoculants. The better mechanical properties of fine grained cast irons were accompanied by greater shrinkage in green sand castings but not in dry sand.

Crystal Formation—A. Lehtinen (Finland—written in German) described a new method of following crystal formation in molten cast irons by measuring the velocity of ultrasonic waves passed through the solidifying metal as it cools. This was done by attaching the ultrasonic equipment to the upper end of a water-cooled austenitic steel bar, the lower end of which dipped into the melt. This lower end previously was held in molten borax at 1000° C (1832° F) for one quarter hour to assure good contact with the molten iron. One time-impulse echo diagram was illustrated but no experimental results were quoted.

Hot Blast Cupola—R. Doat, H. Doutreloux and H. de Rijcker (Belgium—written in French) reported an interesting investigation on the M.B.C. hot blast cupola. The position of the hard central core of the charge in the melting zone, sometimes known as the dead man, the flow of the blast through each tuyere and the analysis of the atmosphere in the plane of the tuyeres were all found to show marked and irregular variations. The variation in flow through each tuyere was illustrated by a film showing graphs of flow against time and views through a tuyere into the cupola accompanied by a sound track in which the pitch was related to air flow and could be related visually to coke movement.

Further samples were taken of the materials in the cupola both at and below tuyere level. These showed that at the tuyere level, there is a zone of strong oxidation but that below the tuyeres there is a very hot and strongly reducing region high in carbon monoxide. Here the metal losses are reversed, and it is argued that this reduction is worth the somewhat higher coke consumption needed to reach the high temperature. The M.B.C. furnace may differ from other hot blast cupolas in this respect.

Cumbustion Velocity — Another paper on cupola performance by C. Podrzucki (Poland — written in German) dealt with combustion velocity which was defined as the



are built to do an outstanding job.

There's a lot to be said also about Fremont Standard and Flexible Jackets. Write today for full description and prices.

The Fremont Flask Co., Fremont, O.

Circle 666 on Page 55

speed with which the combustion surface advances toward the interior of a lump of coke. This influences the height of the combustion zone in a cupola, which is higher the greater are the blast volume and the average coke size and the lower the combustion velocity.

These factors can be connected in a formula by an appropriate coefficient. The value of the latter can be determined from two other coefficients which themselves connect combustion velocity, gas velocity, oxygen concentration, and temperature. Values were determined experimentally in a 10-in.-diam model furnace. From these values the combustion zone heights were predicted for a 20-in.-diam cupola at a number of blast volumes and varying degrees of oxygen enrichment. These predicted values showed good agreement with values determined experimentally.

Electric Melting — E. Zingg (Switzerland—in German) dealt with electric melting in the foundry. After referring to the steady increase in use of electric furnaces, the paper reviewed the various types, including resistance furnaces, channel and coreless induction furnaces of low and high frequency, vacuum melting, and direct and indirect arc furnaces.

In direct arc furnaces, the bad effects of wandering of the arc led to the use of hollow electrodes through which argon could be introduced and the arc became much more steady with low gas pickup by the metal.

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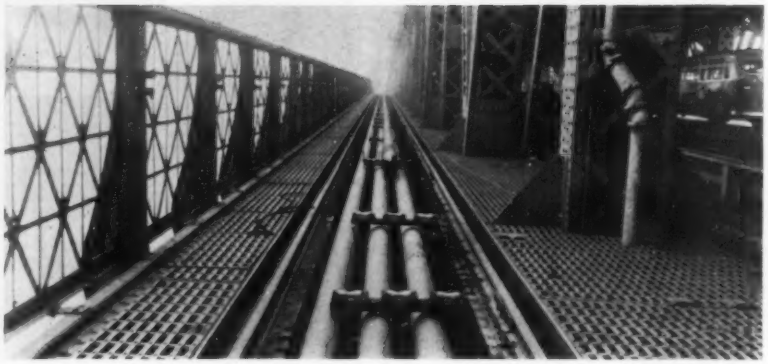
News Views

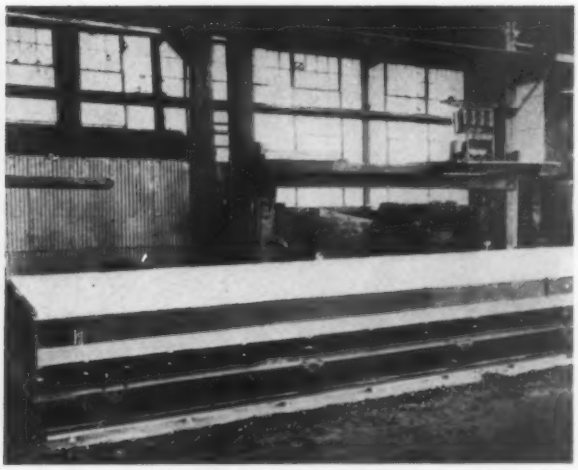
MILL HOUSINGS: Transportation of the largest and heaviest pair of mill housing castings produced in this country required construction of this special railroad car. United Engineering & Foundry Co. cast the housings at its Vandergrift, Pa., plant and used the special car to ship them to its Youngstown, Ohio, plant for finishing. Five ladles pouring simultaneously were required for each casting. The housings are designed for a 166-in. plate mill and weigh 442,000 lb each. Shown is the car and the first casting

PLANT VISITATION: Members of the Chesapeake Chapter of the American Foundrymen's Society are shown here touring the coke plant of Alan Wood Steel Co., Conshohocken, Pa. The tour, an annual affair for the group, included an inspection of blast furnace facilities. George G. Karian, manager of iron powder sales at Alan Wood, spoke at the dinner meeting after the tour on uses of iron powder in the metal powder industry and as melting stock in foundries for specialty applications

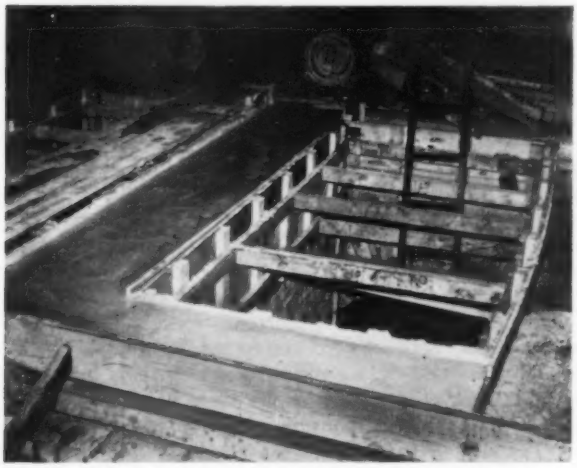
POWER TRANSMISSION: Steel pipes containing electric cable will enable electric power to be transmitted over the East River between Manhattan and Queens by the Queensboro Bridge. The pipes, over 8 in. in diameter and ¼ in. thick, are supported by ductile iron brackets cast by Crompton & Knowles Corp., Worcester, Mass. Three of the pipes are shown in position while the fourth is being slid in place over polyester-coated rollers of the brackets



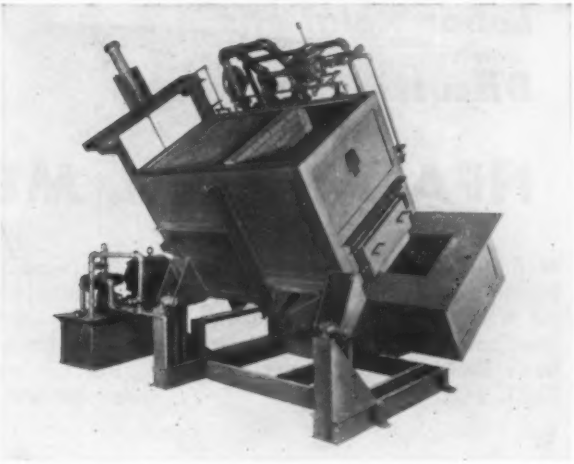
In this stress-relieving furnace, B&W Kaocrete-D is used on the floor ledges, car top, in the door jamb and at the end of the flat roof where it withstands the abrasion of the door. This material is specially designed to withstand severe abrasive conditions and mechanical abuse.



Heavy duty car top service requires a high strength castable. B&W Kaocrete-D is excellently suited for this service at temperatures to 2500 F. B&W Kaocrete-32 is recommended for service above this range.



B&W Kaocrete-32 has been cast to form the curb walls of a soaking pit. When mechanical abuse from ingots damages the curb, Kaocrete-32 has the necessary properties to localize the damage, thus maintaining the serviceability of the rest of the curb.



The castable lining of this aluminum reverberatory furnace must have unusually high strength to withstand the considerable physical abuse of charging, operating and cleaning, while resisting the penetration of the molten metal. Kaocrete-D is widely used in this application.

How B&W refractory castables solve abrasion problems

Refractory castable linings used in metal-working furnaces are often subjected to severe mechanical abuse. Scraping by hand tools, loading and unloading, and the action of the molten metal and particle-laden gases all affect the life of refractories. Among B&W's line of refractory castables are two that are particularly suited to withstand unusual abrasive conditions. They are B&W Kaocrete-D and B&W Kaocrete-32, both of which have been used successfully in many demanding applications.

B&W Bulletin R-35A gives additional information on versatile B&W refractory castables. Write for copy to The Babcock & Wilcox Company, 161 East 42nd Street, New York 17, N.Y.

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Left to right at NFA meeting: W. G. Greenlee, treasurer; C. A. Carolin, incoming president; A. G. Hall, outgoing president; and C. T. Sheehan, executive secretary

Labor Relations Discussion Topic at

NFA ANNUAL MEETING

By ERLE F. ROSS

● A RECORD representation of foundry management participated in the National Foundry Association's 62nd annual meeting at the Edgewater Beach Hotel, Chicago, Sept. 22-23.

Like the previous year's gathering, the meeting was in the format of a labor relations conference. Featured in luncheon addresses were reports on immediate and long-range business prospects, and the effect of foreign competition on the foundry industry.

Concurrent roundtable sessions were conducted for foundry managements whose workers are members of the same union. These sessions provided opportunity for informal discussions of developments in various sections of the country and assessment of union goals.

These sessions and their discussion leaders were as follows: International Molders and Foundry Workers Union—R. D. Phelps Jr., president, Francis & Nygren Foundry Co., Chicago, and Alexander McCurdy, director, industrial relations, Campbell Foundry Co., Harrison, N. J.; United Steelworkers Union—Charles Walker, director, industrial relations, Vulcan Mold & Iron Co., Latrobe, Pa., and K. J. Thompson, works manager, Chain Belt Co., Milwaukee; United Auto Workers Union—William Raven, vice president, Continental Motors Corp., Detroit, and Phil Hahl, con-

Mr. Hall, outgoing president, on right, presents honorary membership award to Herman Benck

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troller, Sibley Machine & Foundry Co., South Bend, Ind.; and Non-Union Shops—Martin J. Ewald, Detroit, regional counsel, National Foundry Association.

Discussion Topics—The program also featured concurrent sessions on labor relations during which discussion was focused on a number of topics of greatest current importance to foundry management, including management rights, preparation for bargaining, contract negotiations, foreman training in labor relations, computing the cost of fringes, grievances and arbitration.

Specific labor-management sessions and discussion leaders were "Preparing for Bargaining"—John Schuler, executive vice president, Anderson Electric Co., Birmingham; "Management Rights"—Paul A. Dodge, personnel director, Neenah Foundry Co., Neenah, Wis.; "Computing the Cost of Fringes"—James A, Ansberry, assistant treasurer, Madison Foundry Co., Cleveland; and "Foreman Training in Labor Relations"—E. C. Thompson, Ohio Brass Co., Mansfield, O.

In opening the meeting, NFA President Arthur G. Hall, works manager, Nordberg Mfg. Co., Milwaukee, observed that the large attendance, the best for many years, bespoke a growing interest in labor relations in the foundry industry.

Must Keep Informed—Mr. Hall, who was completing his third and final year as president, re-emphasized a point he has made previously—namely, that the industry cannot operate its plants today, whether union or nonunion, without thorough, accurate, and up to-date information on wages, pensions, insurance, work rules, incentives, and the other dozen of facets involved in the intricate package of labor relations.

The NFA, through its staff and its research program, including the wage survey and contract analysis, he declared, is the source of ready reference on these matters. While the association program is equal in breadth and depth to any labor advisory service, Mr. Hall said it is much more valuable because it highlights and pinpoints those developments in legislation, bargaining, or arbitration which directly affect the foundry business.

Another program given attention in the past is strike insurance. Because of inability to obtain coverage for members with insurance underwriters, active work on the matter has been suspended. Meanwhile, the operation of strike insurance in other industries will be watched with a view to exploring the situation again.

Business Prospects—In addressing the opening day's luncheon on "Short and Long-Term Business Prospects," Dr. John K. Langum, head of Business Economics Inc., Chicago, stated that some clouds are on the horizon and there are going to be some difficulties in the economy. Association members recalled that Dr. Langum had addressed their annual meetings in 1956 and 1958 and on both occasions his forecasts of what was ahead in business were remarkably accurate.

So far, 1960 has been a disappointing year, the speaker said, and for two big reasons—the extremely unrealistic and excessively optimistic expectations many people had at the start of the year, and major inventory adjustments. As to the latter point, he mentioned that businesses were adding to inventories at a rate of almost $12 billion a year. This figure dropped to about $5 billion in the second quarter, and in July, for the first time, business inventories in general went down. Dr. Langum emphasized that a swing of $12 billion in inventories, even in a $500 billion plus economy, is a significant change.

Recessionary Period Coming

In the speaker's opinion, the country is riding into a recession. It is a recession—not a depression—and "will be more characterized by difficulty in moving ahead for a while, rather than by any sharp drop."

Dr. Langum discussed four fundamental problems. First, is weakness in demand for private durable goods.

The second problem is in the field of money and debt. The tremendous excessive money supply created in World War II has now been used up by inflation and business growth, the speaker asserted. Despite more money than ever before in history, there is less currency in relation to the size of the American economy than at any time in the last 35 or 40 years. As to debt, there is a disposition to halt going further into debt.

Third fundamental problem is price-cost relationships and profit margins. Business is experiencing a major deterioration in profit margins, and with some drop-off in sales, there are going to be serious problems on profits.

Dr. Langum said the fourth fundamental problem is a change in people's thinking about inflation and about population trends. And there has been too much talk and too much unrealistic thinking about growth over the years and not enough thinking about how things

National Foundry Association Administrative Council meets

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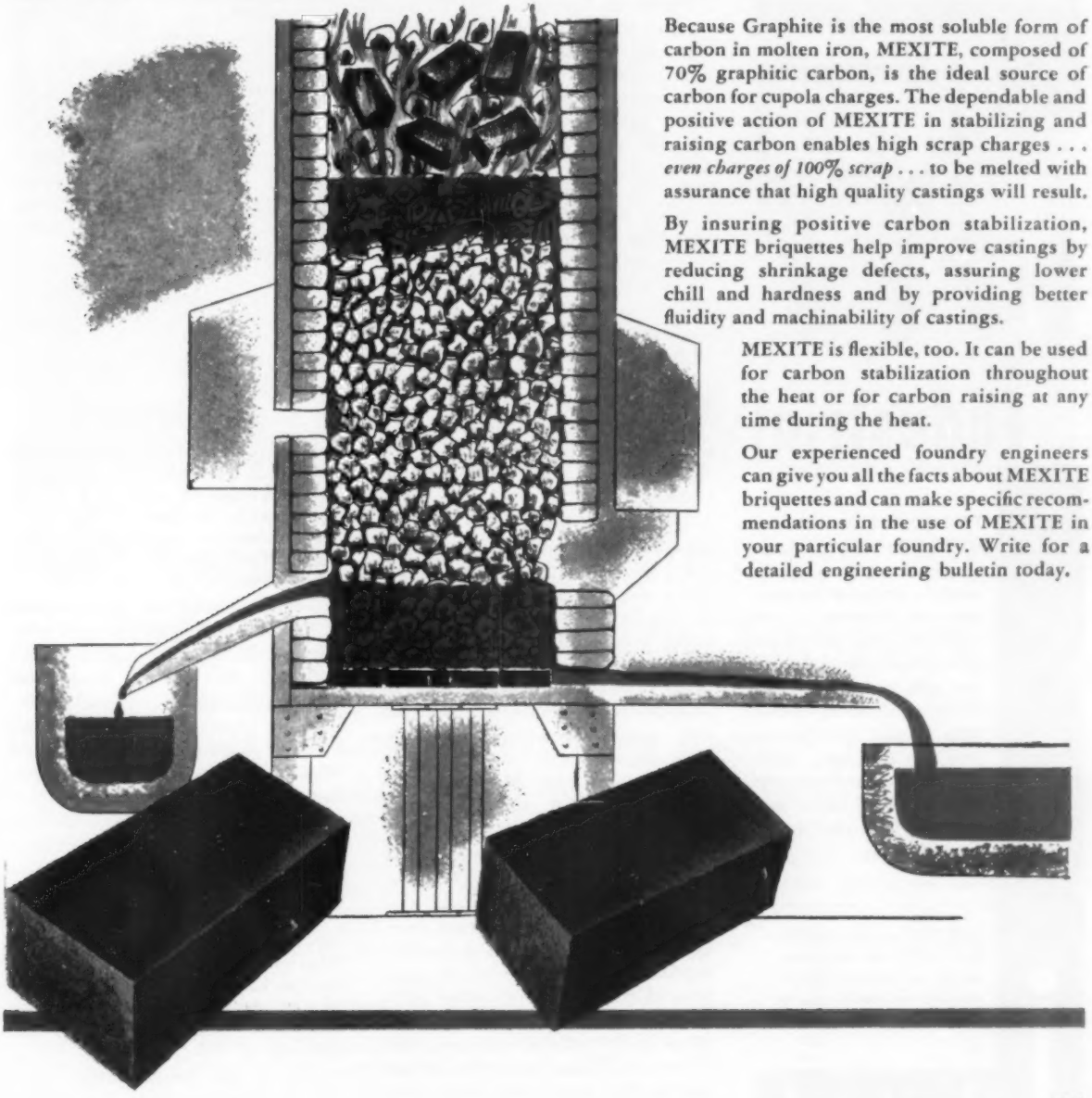

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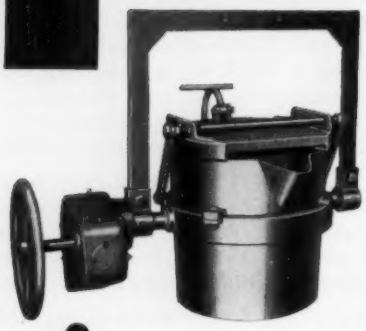

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are in individual years.

The speaker concluded by saying that during the present decade the American economy will score tremendous achievements in terms of production, productivity and profits, standards of living, and our strength as a nation. The American way to achieve this, he emphasized, is to face these problems, regard them as challenges, and convert them into opportunities.

European Foundries — "Foreign Competition" was the subject which Herman Menck, vice president, Harnischfeger Corp., Milwaukee, discussed at the second day's luncheon. Late in August, Mr. Menck returned from nearly nine months in Europe.

For an American company to do business in Europe in end products, Mr. Menck thinks it may be necessary to make these products over there. In his judgment, in about five to ten years, costs will be about the same on both sides of the ocean. Then will come the matter of the 10 per cent markup on goods. The American manufacturers can't stand this markup against competition of Europe or Africa where Europe has shorter hauls than the United States.

Mr. Menck told of the tremendous industrial recovery Europe has made and cited this as well as the lower wage rates prevailing abroad as providing the momentum for the stiffer competition to be expected within the next decade. It is his belief, however, that the lack of skilled labor in European countries will operate as a leveling factor. This shortage will cause wages to rise, thus reducing the margin between European and American wages.

Interestingly, Mr. Menck took along on his trip some 100 representative castings that Harnischfeger Corp. buys and got quotations from various European foundries for Milwaukee delivery, not for the purpose of buying but to make price comparisons. He reported that prices on 50 castings were somewhat lower and 50 were somewhat higher, and in the main they were even. There would be no advantage for an American manufacturer to purchase castings in Europe, he contends.

New Officers—Recently elected new officers were installed at the second day's luncheon. Charles A. Carolin, Carolin Foundry & Machine Co., Detroit, is the new president. Howard M. Winterson, vice president, Blaw-Knox Co., Pittsburgh, is the new vice president. W. G. Greenlee, president, Greenlee Foundry Co., Chicago, was reelected treasurer; and Charles T. Sheehan continues as executive secretary.

New members of the Administrative Council are as follows: Gardner Van Duyne, Meeker Foundry Co., Newark, N. J.; J. S. Robbins, vice president, Vulcan Mold & Iron Co., Latrobe, Pa.; Phil Hahl, controller, Sibley Machine & Foundry Corp., South Bend, Ind.; Ray Heiden, vice president, Galva Foundry Co., Galva, Ill.; Edward Sitanz, president, Prospect Foundry Co., Minneapolis; F. C. Perkins Jr., vice president, Henry Perkins Co., Bridgewater, Mass.; John McGill Jr., resident manager, U. S. Pipe & Foundry Co., North Birmingham, Ala.

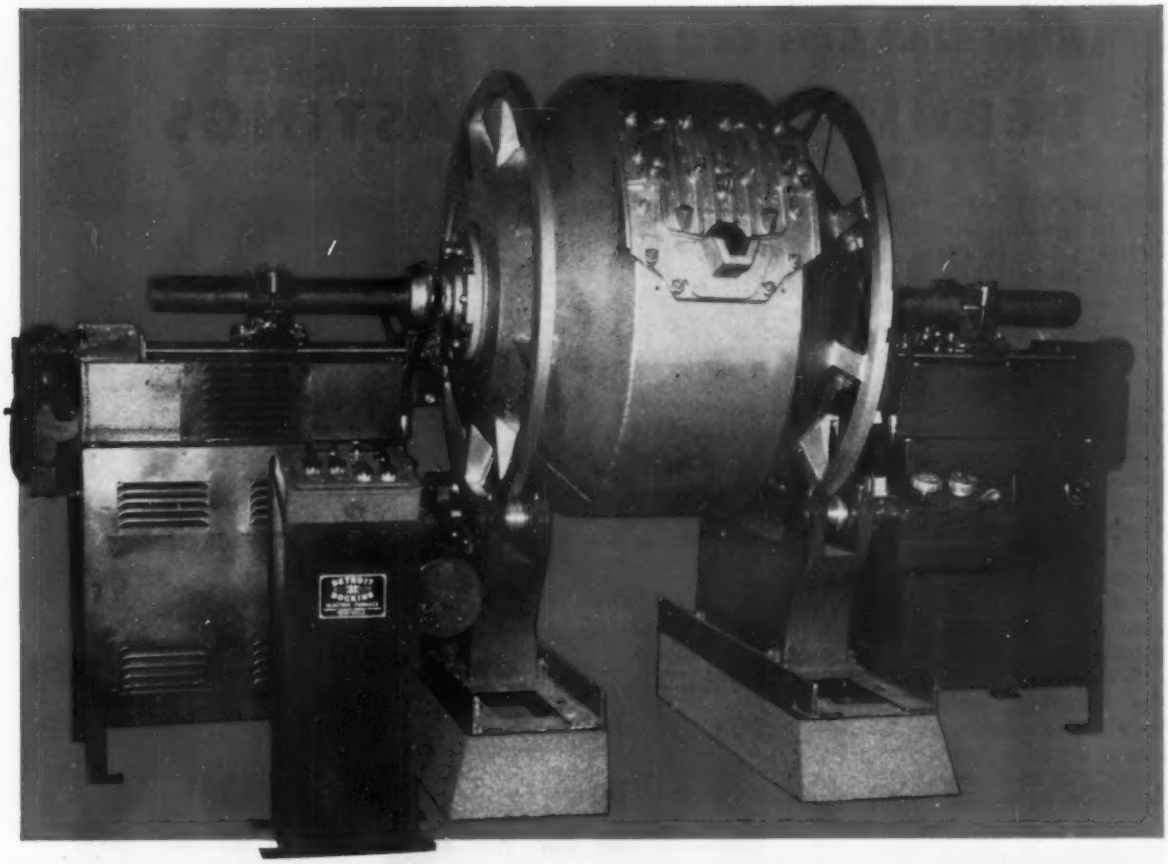
Book Reviews

British and Foreign Specifications for Steel Castings, **Part 1, paper cover, xiv and 48 pages, 8 x 10 in., published by the British Steel Castings Research Association, East Bank Road, Sheffield 2, England. Price $7.50.**

Guide summarizes requirements of national standards for steel castings issued in many countries and indicates the nearest comparable British Standard Specifications. Part 1 covers Austria, Belgium, France, Germany (Eastern and Western), Great Britain, Sweden, Switzerland, and the United States. Lists of standards current in Czechoslovakia, Holland, and Italy are provided also.

Machine Shop Operations and Setups, **by Harold W. Porter, Charles H. Lawshe, and Orville D. Lascoe, hard cover, 449 pages, 5½ x 8½ in., published by the American Technical Society, 848 E. 58th St., Chicago 37, Ill. Price $5.50.**

This is the second edition of a text designed to meet the specific requirements of modern instruction in machine shop techniques. It incorporates new operations and developments and includes sections on heat treatment and the machinability of metals.



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The new "P" Series Detroit Rocking Electric Furnaces feature a simplified arc control system combined with motor-driven, pedestal-mounted electrodes.

The indirect arc is automatically controlled by a magnetic amplifier which adjusts motor speed in direct proportion to arc unbalance. This instantaneous action provides maximum heat per power input. There are no moving parts, relays or contactors to break or wear out.

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For full details on the new "P" Series indirect arc Detroit Furnaces, write for Bulletin 5610.

Ratings for furnaces with pedestal-mounted electrodes, motor controlled

Furnace Type	KW Rating	Nominal Cold Charge	Minimum Molten Metal
LFCP	125	350	500
LFNP	150	500	750
LFYP	175	700	1250
AAP	250	1500	3000
AAP	400	1500	3000
CMP	400	4000	8000
CMP	600	4000	8000

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Blast Unit Cuts Cost in

DEBURRING DIECASTINGS

● ELIMINATING a hand operation in deburring diecastings saves $30,000 a year for Clinton Engines Corp., Clinton, Mich., the company estimates. Clinton, manufacturer of small air-cooled gasoline engines, uses diecastings for many parts of its engines and accessories.

In the interest of quality control, deburring of these castings originally was set up as a hand operation. In switching to the blast method, deflashing was attained along with deburring. Trim edges are smoothed, appearance of the finished casting is improved, and the matte surface produced by the blast process provides vastly better paint adhesion.

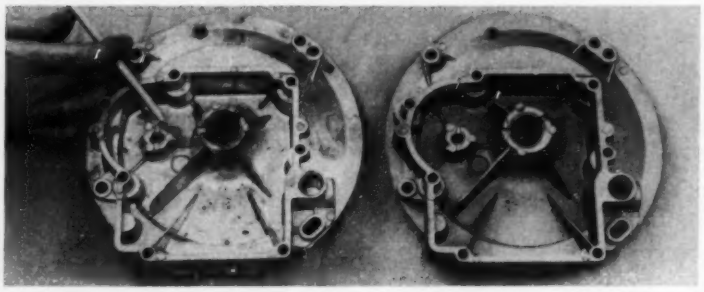
Savings occur primarily because the diecastings, instead of being handled individually, are blast deburred in large batches. For example, 875 reed plates can be deburred in six minutes. This time saving on a yearly schedule of 900,000 pieces cuts costs by $3960.

Engine bases are deburred in batches of 70 in three minutes, giving an annual saving on 900,000 pieces of $3330.

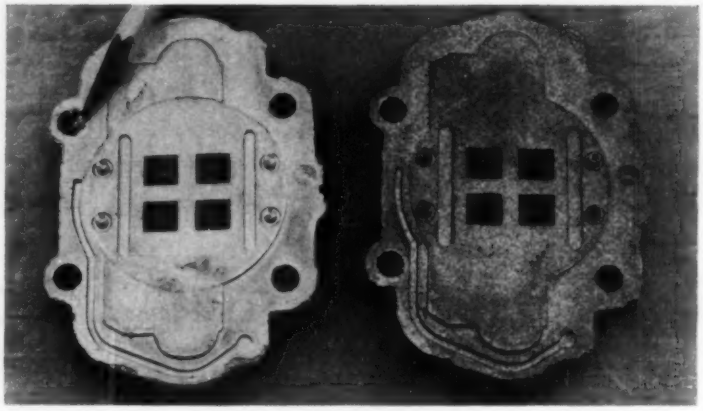
These savings are considered typical of approximately ten items now handled by the new method. Total saving is computed at $30,000 annually. Total cost of the new equipment — blast machine, automatic loader, and dust collector—was less than one-third of this amount.

The blast machine, a standard 6-cu-ft barrel manufactured by Pangborn Corp., Hagerstown, Md., is positioned adjacent to the trimming operation so that trimmed parts drop alongside the blast machine's loader. From here the loader is easily filled, and a pushbutton sets the loading-deburring cycle in operation. The trimmer operator handles both machines without difficulty or delay.

S-170 steel shot is the abrasive used. The blast barrel incorporates abrasive cleaning and recycling equipment for removal of flash particles, burrs, fines, and dust from the good abrasive. A Pangborn cloth bag dust collector exhausts the deburring operation.



Engine base diecasting before (left) and after blast deburring. Savings of over $3000 per year are achieved on this one part



Blast deburring results in the matte finish shown by reed plate casting on the right. This finish provides better paint adhesion

Diecastings are deburred in batches. Blast equipment is placed adjacent to the trimming operation to simplify material handling and to enable the trimming operator to run both machines

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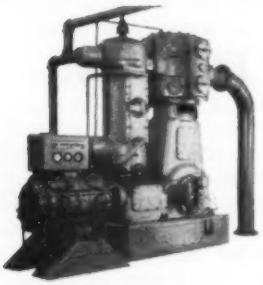

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What's your compressor requirement? Need an installation large enough to provide air for all your needs? Or would a small, compact unit for auxiliary operation solve your immediate problem? Either way—and for a wide range of applications between these extremes—Atlas Copco has the compressor for you!

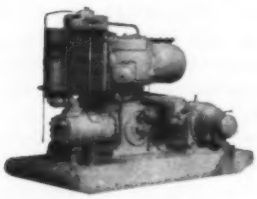
No matter which you choose, you'll get these proven advantages from Atlas Copco:

(1) More air per horsepower—less power consumption than other comparable units!

(2) Really low maintenance (one example—$310 after 10,000 hours' operation)!

(3) Specifications are guaranteed free-air delivery—you get exactly what you order!

Get all the facts now—and compare! The coupon below will bring you a free catalog. (No obligation, of course.)



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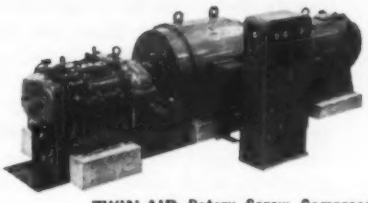
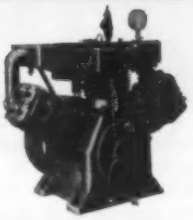
Same basic construction as the AR Series, but provided with an air-cooled intercooler and air-cooled radiator for the cylinder water. Fan on compressor flywheel cools radiators. Perfect for arid areas or where difficult to bring in water. Both stationary and skid-mounted models available.



TWIN-AIR Rotary Screw Compressors

Brand new! "Twin-Air" Compressors offer capacities from 6,900 to 19,400 cfm at working pressures up to 115 psi. And, you get completely *oil-free* delivery of air or gas, since no lubrication is required — timing gears maintain small clearances between precision-mounted rotors, eliminating friction (and the necessity of oil) in compression chamber.



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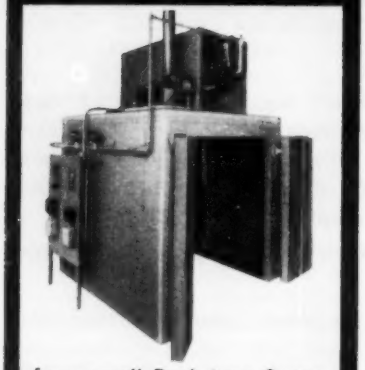
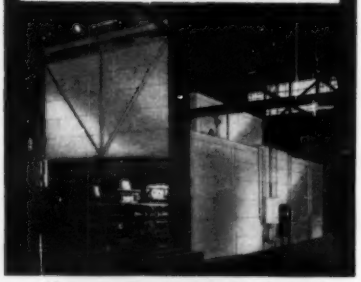
LANLY heat processing equipment for the FOUNDRY INDUSTRY



from small Rack type Ovens to the BIG CAR TYPE OVENS



If a need arises to replace or improve your Foundry Ovens, it is only logical to look to LANLY, recognized authorities in the design and construction of heat processing equipment for more than 22 years.

TODAY may be the opportune time to survey your present facilities and request the counsel of a LANLY representative at no obligation.

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The Sandman Says

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"On Progress and Post Mortems"

● IN EVERY PHASE of human activity, men derive inspiration from, and build on, the work of their predecessors. We like to simplify history by pointing to one man and saying, "He did it!" We credit Edison with the phonograph and electric light, Marconi with radio, Newton with the formulation of the law of gravitation, etc.

These men captured our imagination in a dramatic manner, and at a psychological moment, but they merely developed to a logical conclusion what other men had been working on, unheralded, for centuries.

Sydney Harris, a columnist, recently wrote, "Last year, more than 1100 scientists and educators in 46 countries were asked to cast their votes for 'the greatest scientist' of all time. The easy winner was Isaac Newton, the British mathematician who formulated the laws of gravity and motion. Newton came in ahead of Aristotle, Euclid, Archimedes, Copernicus, Galileo, Descartes, Kepler, and a score of other celebrated innovators.

Newton Provided Incentive

"What is most interesting about this selection is that Newton turned out to have been wrong. Newtonian physics has been abandoned in the 20th century, and his laws have been superseded by the discoveries of Einstein and Maxwell, Planck and Rutherford.

"It is the new light he threw on dark corners, the profundity and originality with which he attacked ancient problems, and, most of all, the incentive he provides for further research in the field which are important. The universe of Newton has collapsed; but the incentive he provided has carried us to undreamed of limits."

Isn't this true in more modest although no less important realms of human endeavor? Our scientists would be sorely handicapped without the farmer and foundryman and numerous other sources of direct and indirect assistance, not to mention their mentors and academic predecessors. We think of and value a rose in full bloom, but only a true gardener evaluates it at every stage of development, as well as the bush which bore it.

Foundry Progress—We have, admittedly, come a long way in our foundry practice during the last half-century. From loam sand to shell molding unquestionably is significant progress, and much credit for this achievement is due to many who are still engaged in the attempt to perfect the new method. But our enthusiasm should be tempered by the knowledge that these ideas were generated and being considered even before the birth of present day foundrymen.

Another sobering thought logically follows: What will foundrymen 50 years from now have to say about our original ideas?

As I look back over my own mediocre experience, I am forced to recognize the creative ability—even genius—of some of my supervisors and co-workers, who laid the groundwork for much of our progress. As Harris pointed out, "It is

the new light thrown on dark corners, the profundity and originality displayed, the incentive for further research, leading to undreamed of limits."

The most unobtrusive, least promising individual in your plant may be germinating an idea which could revolutionize the foundry practice of tomorrow.

POST MORTEMS

By an intelligent analysis of today's errors, we should be able to prevent or reduce those of tomorrow.

A casting defect committee, composed of all department heads concerned with casting production, should confer daily to express personal viewpoints regarding the nature of each casting defect, its cause, and the most likely approach to a feasible remedy.

If possible, a majority opinion should be received as to the exact nature of the defect—that is, can it be classified as a core or mold blow, scab, buckle, broken core, sand wash, etc.? This decision usually is arrived at without much difficulty.

What's the Cause?—What caused the defect? At this point, we encounter imponderables, for rarely do two individuals agree on the exact nature of a cause. The cause could be a single fault, or a combination of two or more conditions. Where the defect can be traced directly to sand failure, we may have what has been referred to as major and minor causes. In some instances, these are difficult to differentiate.

For instance, a motor bell casting has a small scab on a green sand drag pocket. We may attribute this flaw to hard ramming, wet sand, or both. I am inclined to believe that it usually is a matter of excess moisture. I do not blame the ramming, or even low permeability, for I firmly believe that if sand has sufficient green and dry strength, hard ramming will have no deleterious effect.

It is understandable that where a high silica sand is used, without sufficient cushioning material to offset expansion, a scab can occur even if moisture is not excessive. In our iron practice, however, this condition rarely occurs.

Perhaps I'm belaboring the point, but I've always considered permeability to be a purely relative factor. It has indicative value, but does not create defects any more than a thermometer creates a storm. Beautiful castings are produced in permanent molds, in which permeability is zero. Very high permeability in green sand might cause metal penetration or rough finish, but you don't need a permeability reading to inform you of these dangers.

Our casting defect or postmortem committee is composed of men whose experience and resultant judgment should qualify them 1) to detect a defect quickly and beyond much argument; 2) to be reasonably certain as to its nature; and 3) to have one or more suggestions as to how to prevent repetion of the defect.

Watch That Third Step—It is with regard to this third step that many of our headaches develop. If the diagnosis were made in accordance with our best foundry reasoning, much time and money could be saved, and dissension could be reduced. Self-preservation is said to be the first law of nature, however, and each man strives to protect the record of his own department and to divert the blame from himself. Heat is generated and light obscured.

This third step frequently leads us up dark alleys, where one man's opinion may be as good as the next. We may be dealing again with imponderables, the unknown X, which defies every rule that we've ever learned.

Scab Remains a Mystery

For instance, 10 six-cylinder motor blocks were cast, each mold containing 28 cores. The result: Eight good castings and two which had to be scrapped because of a small scab on the barrel or main core. On each of these discarded castings, the scab, about the size of a nickel, was on a core away from the gate and in a similar location. If we knew the cause, we'd have the answer, but so far every solution proposed appears to be a guess in the dark, with no basis whatever in logic.

In the absence of even a trace of understanding, we probably will do several things or nothing at all and, however illogically, this particular defect may not reappear. Until we acquire more knowledge or greater reasoning power, our baby scab will remain a mystery.

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Taylor Made CHAIN SINCE 1873

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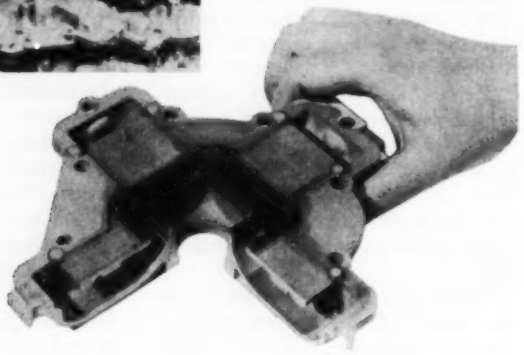
Flow gun is used to apply the structural adhesive to surfaces of components used in a pump assembly. Joining operations which use structural adhesives require no skilled labor



Cutaway section of pump assembly. Two components are diecast aluminum, and the square section in the center is stainless steel

STRUCTURAL ADHESIVES

. . . *Simplify Making of Complex Castings*

● STRUCTURAL ADHESIVES have the potential to eliminate some of the headaches caused by problem castings. Such castings often have complicated interiors and are produced as single castings but with high rejection rates. By using structural adhesives, these complicated components often can be built up from a number of simple castings which are easier to cast and have negligible scrap rates.

The aircraft industry pioneered the use of structural adhesives to overcome certain difficulties connected with brazing or riveting. Honeycomb construction widely used in today's aircraft was made possible by the development of structural adhesives.

Pump Part Complex — An example of application of structural adhesives is offered by a large pump manufacturer which was using an aluminum sand casting with a complex interior design. Defects were causing a rejection rate of up to 25 per cent, or more than $750 loss for every 1000 castings. It was decided to assemble the component from three simple parts, using a structural adhesive.

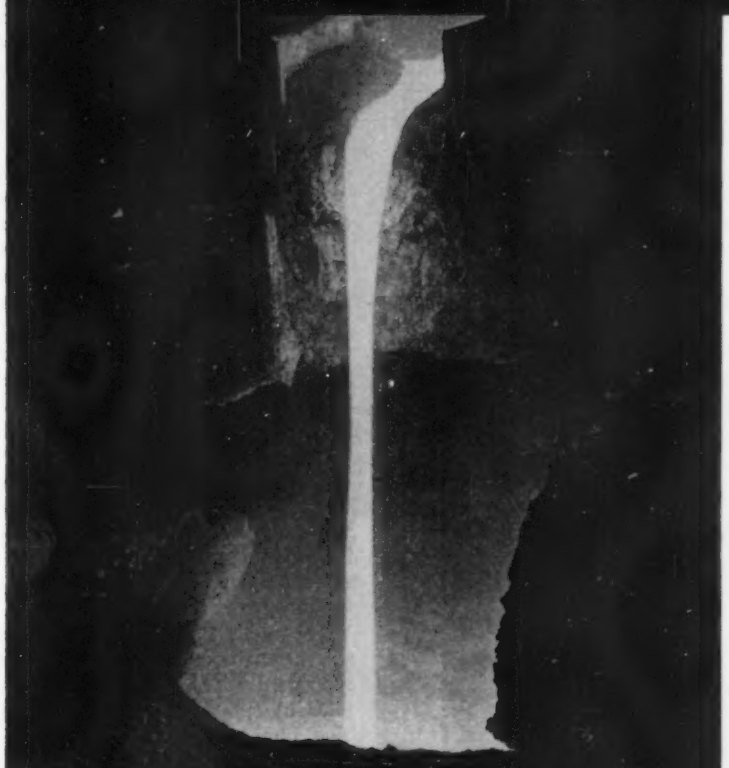
Two aluminum diecastings and a stainless steel insert were used in the new assembly with an epoxy-based adhesive developed by Minnesota Mining & Mfg. Co., St. Paul. The castings were cleaned by sand blasting, and the resin adhesive was applied to one contact surface of the diecast sections by a pressure gun. Then the sections were assembled.

Since the adhesive had void-filling properties, the mating surfaces of the castings did not require close-tolerance machining. The assembled part was cured for one hour at 350° F in a circulating air oven. No expensive indexing or pressure jigs were required. Twenty-five castings were cured at one time while another batch was being assembled.

Advantages of Process—Adhesive bonding for assembling the component was selected because it has several advantages over other means of assembly. The use of adhesive eliminates the need for the lugs, bolt holes, and flanges required with mechanical fastening. Because no holes are used, no machining operations are involved. Also, adhesives automatically seal component sections when they are bonded together, eliminating time and cost of separate sealing or gasketing operations.

High heat, such as used in welding or brazing, is not required, so this cause of distortion is eliminated. And because no corrosive fluxes are needed, expensive neutralizing operations are eliminated. Special

In iron foundries today the trend is to...



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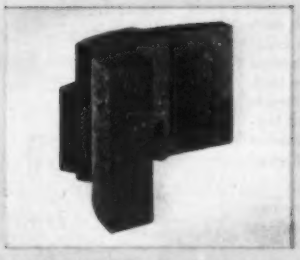
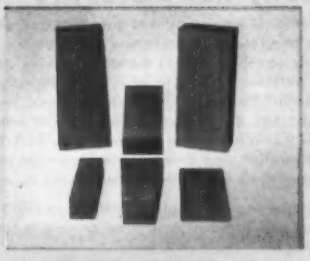
Whether you use carbon block and brick for lining cupolas and runout troughs... carbon paste for patching ... graphite tubes for injection and upgrading of iron... graphite plungers for producing ductile iron... or core rods and chill plates—you'll find these products all help reduce maintenance, speed production and lower overall costs. For details write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.



CARBON BLOCKS—Provide long refractory life in the cupola.



CARBON BRICK AND PASTE—Proved materials for cupolas and runout troughs.

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weldable alloys need not be used because less expensive alloys can be bonded equally well.

Even skilled labor is not required for bonding operations, another cost saving. Bonding methods are adaptable to both short runs and continuous production.

Several Types—Structural adhesives come in several different types. They include one-part heat curing liquids, two-part room temperature curing liquids, and adhesive films of uniform thickness and weight that cure with heat and pressure. Thermosetting film adhesives are readily adaptable to assembly since they can be die-cut to any shape to eliminate waste.

The heat curing liquid is cured in 40 to 60 minutes at temperatures up to 350° F or in 1 to 2 minutes at 500° F. Room temperature curing liquid is made up just before use from a base resin and a separate liquid catalyst or curing agent. The two materials must be mixed together before curing will begin.

Structural adhesives are resistant to various types of environment such as tap water, salt water, hydraulic oil, aromatic fuels, and dry heat. Shear strengths range from 5500 psi at 75° F up to 1050 psi at 400° F. Almost any type of metal can be bonded with structural adhesives, including aluminum, magnesium, steel, stainless steel, brass, and titanium; also many plastics.

Three-Step Process — Fabricating with structural adhesives is done in three steps: Surface preparation; adhesive application; and bonding. Surface preparation can be performed by chemical cleaning, sand blasting, vapor degreasing, or solvent wiping. Chemical cleaning is preferred where high performance is required and the rate of production warrants installation of proper equipment. Sand blasting is simpler but the parts must be of sufficient thickness to prevent distortion. Vapor degreasing or solvent wiping is recommended only where maximum adhesive strength or outdoor weathering is not required.

The adhesive can be applied by several methods depending on the type used. The liquid can be applied by spray, flow gun, or brush. The film is applied by a method known as "tacking," which means using heat guns or soldering irons.

Hot air convection, steam or heated oil, and electrical resistance are the methods most often used to heat the parts to be assembled. Pressure can be maintained by mechanical fixtures, pneumatic or hydraulic fixtures, or pressure chambers. By applying heat and pressure simultaneously, a good bond is insured.

ATTENTION ALL GRAY IRON FOUNDRIES . . .

Now! HOT METAL

NEW U. S. "SKLENAR"

REVERBERATORY

MELTING FURNACE

LOOK AT THE RECORD

Here's authentic performance data on 500 lb., 1000 lb., and 2000 lb. U. S. "Sklenar" Furnaces equipped with straight gas, oil, or dual fuel burners (no addition of fuel oil necessary when firing with gas), all three furnaces melting gray iron to high temperature for pouring light and difficult castings, with full charges consisting of one half pig iron, with balance in gates, risers and ordinary purchased scrap.

MELTING DATA

500 LB.	1000 LB.	2000 LB.
Time: 30 min.	Time: 40 min.	Time: 45 min.
Oil Used: 11½ gals.	Oil Used: 19 gals.	Oil Used: 40 gals.
*Gas Used: 1400 cu. ft.	*Gas Used: 2800 cu. ft.	*Gas Used: 5250 cu. ft.

*1030 BTU

Really hot metal . . .

of sufficient temperatures to pour light and difficult castings of excellent structure and machinability, with practically no rejects—that's the money-saving story behind the performance record of the revolutionary new U. S. "Sklenar" Reverberatory Melting Furnace. Innovations in combustion, design and construction, with patented features that contribute to faster melting, built-in economy of operation, and lower maintenance costs, are all yours in tomorrow's method of melting metals today!

Available in sizes ranging from 500 to 2000 lbs.—iron, brass and bronze (⅓rd these capacities for aluminum melting).

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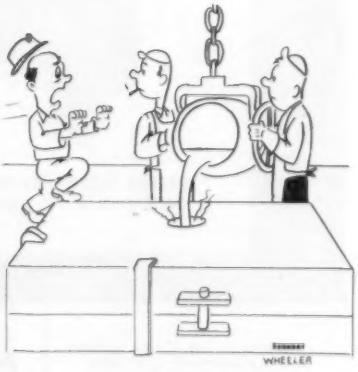
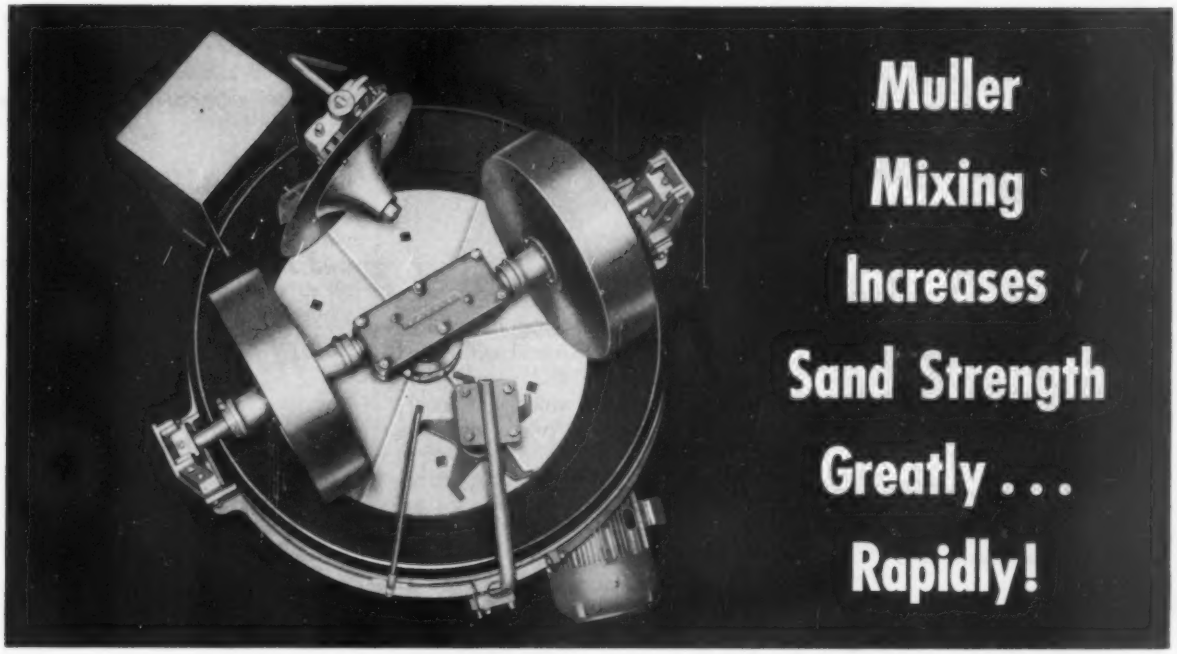
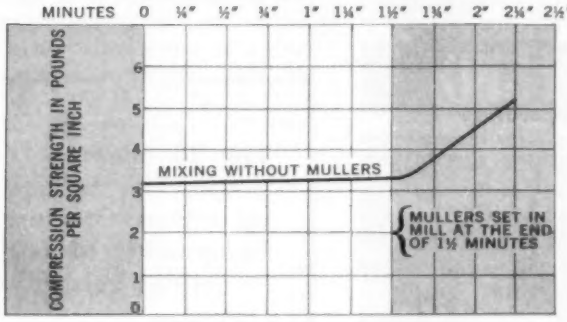


"Stop! Stop! They cancelled the order!"



Sand Strength Curve Proves the Difference



This Strength Curve Chart demonstrates how much more effective muller mixing of sand is over regular scraper type mixing. In this test a Clearfield mixer was used to mix a charge of 91% burned sand, 3% bond and 6% water. At the start of the run the mulling wheels were removed completely . . . the batch was charged and the mixing operation continued for 1½ minutes with only the disc and agitator operating on the material. *There was only a slight increase in the strength of the sand.* Then the mullers were set into the machine and operation on the same batch continued for 1¼ minutes. During this very short period with the mullers operating, *the sand strength increased very rapidly.* You can speed production, with assured quality results—and cut costs too—with a Clearfield muller-type mixer. *Let us prove the superiority of Clearfield Muller-type Mixers with a sample run of your own batch. Just call us.*

WITH its speed, dependability and special mixing features, a Clearfield Mixer prepares your sand properly and exactly as you want it . . . thus paying for itself many times over. In addition to the strength-building mullers, Clearfield Mixers have other features that assure quality results every time. First, all Clearfield Mixers work on the rotating pan principle so that every particle in the batch is kept in continuous motion, with the ingredients alternately spread and gathered together to maintain highest mixing efficiency.

Another feature is the patented star-shaped agitator which covers the entire flat surface of the revolving bottom and prevents material from forming hard cakes or lumps. The agitator is driven automatically by the force of the sand being rotated by the pan motion; a "whirlpool" action is created, speeding up the mixing process and promoting clean emptying of the pan.

The Clearfield double-duty disc, also patented, cuts all the material free from the revolving pan rim at each revolution, turns it over and diverts a continuous roll of material under the mullers. (Moved to the discharge position, this disc unloads the complete batch in 15 to 20 seconds!)

You get thorough, proper blending and mixing when you use a Clearfield Mixer.

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MACHINE COMPANY
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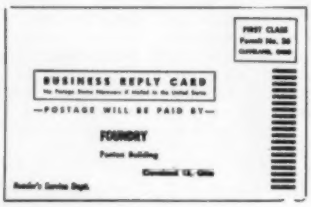


Use an Inquiry Card

For further information on anything described or advertised in this issue . . . . . .

SEE Page 55

PATENTS

Of Interest to Foundrymen

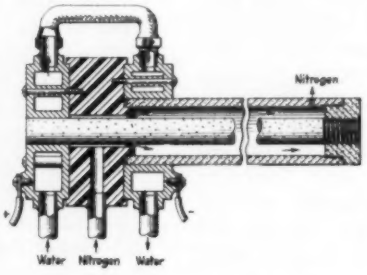
Investment Bonding Agent

Material is comprised of a mixture of sodium silicate and orthophosphoric acid and is mixed with fused magnesium oxide and monoammonium phosphate which are incorporated dry in the refractory. One example is given as 7.85 cc sodium silicate, sp. gr. 1.32; 5.15 cc 75 per cent orthophosphoric acid, sp. gr. 1.58; and 87 cc water. Twenty parts by volume of that solution is mixed with 100 parts by weight of the refractory composed of 93 parts by weight graded refractory, 4 parts fused magnesium oxide, and 3 parts by weight monoammonium phosphate. *Patent No. 2,928,750, granted to C. H. Watts and assigned to Pre-Vest Inc.*

Measures Temperature

A thermocouple for measurement of temperatures above 2000° C (3632° F) employs elements of carbon and carbon-boron. The term "carbon" covers the conventional forms of carbon, including natural or synthetic graphite.

In the accompanying illustration the outer cylinder is carbon and the



inner rod boronated carbon. Water cooling jackets at the ends of the elements form the cold junction of the thermocouple. Boronated carbon element is formed by impregnating a carbon rod with saturated boric acid, placing it in a graphite capsule and packing it with coke and boric acid crystals. Then it is heated and baked to a temperature about 100° above the highest temperature at

A comprehensive text on cupola operation for the metallurgist, foundryman and student of foundry technology . . . . . .

THE CUPOLA AND ITS OPERATION

The 35 chapters are grouped into the following sections: Operations, Equipment, Materials, Principles related to Operation.

More than 50 of the country's outstanding foundrymen have contributed their knowledge and experience to make this book available.

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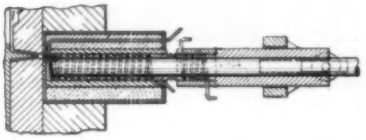
which the thermocouple will be used. *Patent No. 2,946,835 granted to R. D. Westbrook and R. L. Shepard and assigned to Union Carbide Corp.*

Diecasting Machine

Improved method for injection of metal into the die cavity of a diecasting machine is disclosed in a recent patent. Metal or alloy in the form of a bar or rod is fed into a heating chamber of the same cross section as the bar. The inner end



of the bar is melted immediately prior to injection and is forced into the die cavity by advance of the solid outer portion of the bar.

Outer end of the heating or melting chamber is provided with a heat exchanger or chill of the same hollow interior cross section of the bar to preserve the shape, form and rigidity of the bar so that it forms a piston for successive injection operations. *Patent No. 2,947,045 granted to W. M. Goldhamer.*

Ductile Iron Molds

Molds for producing steel ingots have longer life and thinner walls when produced in ductile or spheroidal graphite cast iron and with a low volume ratio between the mold walls and the mold cavity. Composition of the iron is given as 3.4 to 3.7 per cent C, 1.8 to 2.4 per cent Si, 0.25 to 0.5 per cent Mn, 0.03 to 0.10 per cent P, 0.005 to 0.01 per cent S, and 0.05 to 0.08 per cent Mg.

Ratio of volume of mold walls to volume of mold cavity is between 0.79 and 0.4. One example indicates molds with a ratio of 0.53 gave an average production of 270 four-ton ingots with a consumption of 2.22 kg of mold per ton of steel cast. *Patent No. 2,937,424 granted to E. Guenzi and assigned to Compagnie de Pont-a-Mousson.*

Crack Resisting Alloy

Aluminum-magnesium alloy casting with improved resistance to stress-corrosion cracking preferably

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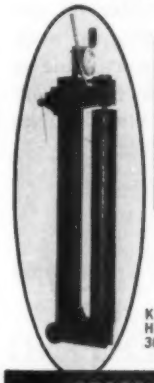

King Test Head in 30" base

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Circle 692 on Page 55

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● These Pre-Alloyed Furnace Charges from Security Alloys, pioneer processors of alloyed nickel, will help reduce your melting time because of their high density and uniform analysis. Tailor-made to most commercial and military specifications, requiring fewer foundry additives and permitting easier prediction of casting analysis.

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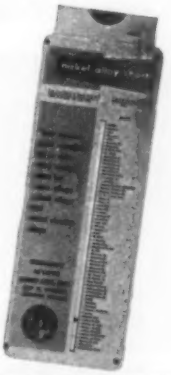
For more information on how our Pre-Alloyed Furnace Charges can save you time and money, *write to Foundry Division, Security Alloys Company, Incorporated, 3106 West 49th Place, Chicago 32, Illinois or phone PRospect 6-8500.*



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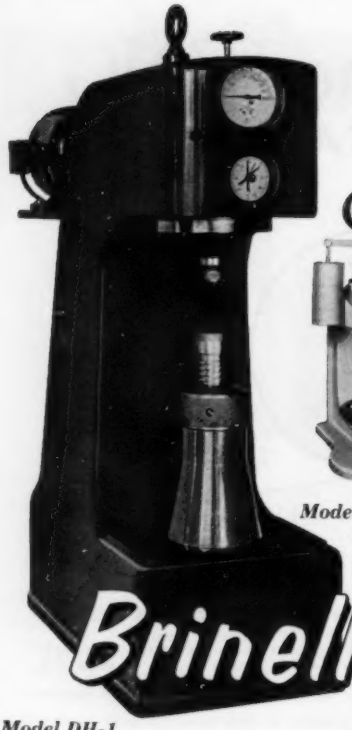

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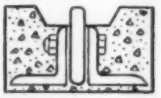
GET MORE USE FROM YOUR FLOOR SPACE with NOMAD RECESSED CONVEYORS!



Nomad Recessed Conveyors give greater flexibility to your operation. The molding area can be used for floor molding or can be quickly changed to a palletized floor depending upon the job. Since the rails are embedded in concrete for stability, the whole area can be worked freely by a front-end loader.

INCREASE PRODUCTIVITY AND SAVE ON MANPOWER—
Molders set molds on wheeled pallets which "roll away" smoothly on rails saving hard physical labor and allowing greater mold production.

Write Today for Catalog showing other types of conveyors and equipment.

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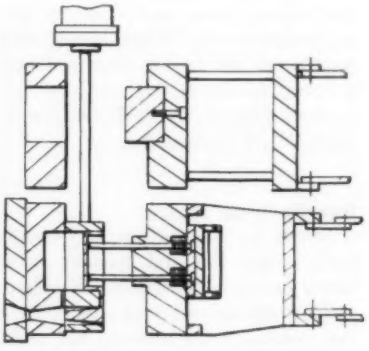
contains 7.4 to 8.4 Mg, 1.2 to 1.7 Zn, 0.1 to 0.2 Cu, 0.1 to 0.3 Mn, 0.3 max Fe, 0.2 max Si, 0.001 to 0.02 B, 0.03 to 0.20 Ti, 0.001 to 0.01 Be and remainder Al.

To develop desired properties, castings are subjected to a two-step solution heat treatment; heating for at least 6 hours at 825 to 840° F, and then without cooling at 875 to 940° F for at least 4 hours. Following heat treatment, castings are quenched in water at 180 to 212° F.

Castings so treated have a typical tensile strength of 48,000 psi, yield strength of 26,000 psi, and elongation of 16 per cent. *Patent No. 2,922,731 granted to H. C. Rutemiller and assigned to Aluminum Co. of America.*

Trimming Diecastings

Trimming to remove flash, sprue and runners from diecastings is accomplished on the machine which produces them. The process involves use of a movable casting holder and a punch tool arrangement at one



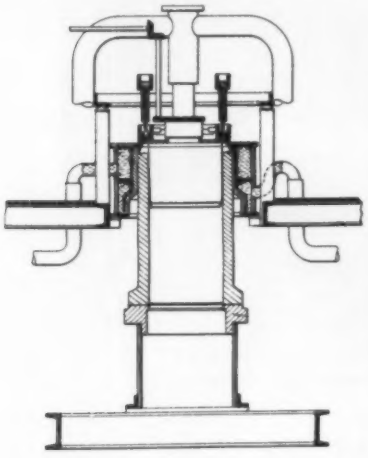
side of the machine. In operation, the casting holder is moved into position to receive the casting ejected from the die as soon as the latter is opened. The holder with its contained casting is moved to the punch tool where the casting is forced through the casting holder, which constitutes a shearing die. Preferably the various movements are arranged to proceed automatically. *Patent No. 2,946,102 granted to A. R. Mills.*

Continuous Casting

Process and apparatus for continuous casting of large bell-end, cast iron pipe or smilar tubular articles include an outer, water-cooled mold member, a tapered, water-cooled inner core member, and means for moving the formed pipe

downward at a uniform rate as the metal becomes sufficiently solid to permit movement.

Additionally the apparatus includes a circular pouring channel containing two downwardly extending discharge tubes for distributing the molten metal into the annular space between outer mold and inner core members. Pouring channel is



attached to a gear mechanism and is rotated during the pouring operation. Inner core member is tapered to prevent seizure by the pipe through contraction resulting from the metal solidification. *Patent No.* 2,941,266 *granted to G. Ostermeyer, A. Wittmoser and R. Kaufmann and assigned to Eisenwerke Gelsenkirchen Aktiengesellschaft.*

Strong Mold Structure

Method of making a high-strength mold structure for casting metals uses a sodium or potassium silicate bonded refractory hardened by carbon dioxide. Surfaces of the resulting mold are treated with a non-aqueous solution of at least one thermosetting resin which is hardened by the application of heat. Then the mold structure is fired in the range 1300 to 1830° F.

Sodium or potassium silicates have a 1:2 ratio and the amount used for bonding may be 3 to 10 per cent. Refractory may be zircon, sillimanite or calcined fire clay grog. Resin may be phenolic type dissolved in alcohol, or a mixture of styrene monomer, unsaturated polyester resin, catalyst, and accelerator dissolved in benzene. *Patent No.* 2,930,089 *granted to H. G. Emblem and Jack Aston and assigned to Rolls-Royce Ltd.*

CHOOSE YOUR WEAPON

for WAR against the SCRAP PILE!

Guessing when to pour, or using inaccurate temperature measuring instruments, results in misruns, cold-shuts or leaving molds on the floor unpoured. Equip your foundry with dependable Marshall Enclosed-Tip Thermocouples for strong, dense, uniform castings from every melt!

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DEEP READING. Takes interior temperature deep within melt . . . tip can be immersed 3 inches or more in depth!

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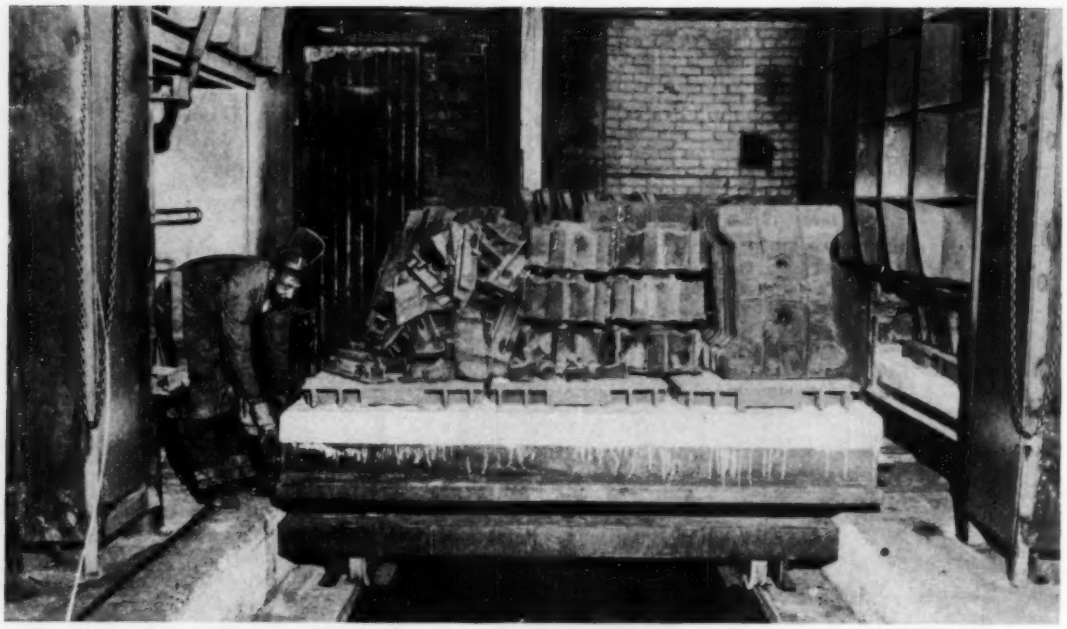
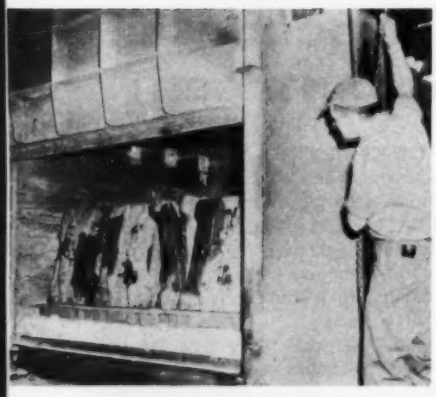
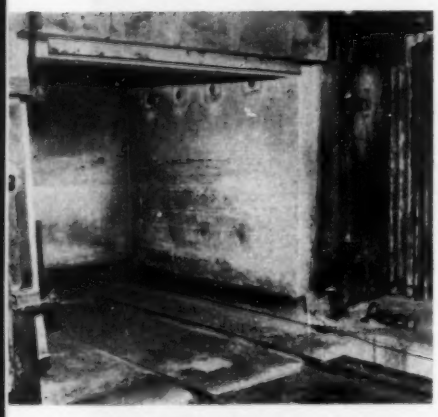


Two car-bottom heat treat furnaces at Dayton Steel Foundry now do work that three manual-loading furnaces did before. Transfer car in the center feeds both furnaces



Furnace is unloaded by moving loaded car onto transfer car



Cast-in-place lining on furnace walls needs little maintenance

2 Heat Treating Furnaces Do the Work of 3

● INCREASED CAPACITY in its heat treating department has been achieved by Dayton Steel Foundry Co., Dayton, Ohio, by replacing three manually loaded furnaces by two furnaces which are designed to operate with an efficient material handling system.

Dayton Steel Foundry is a major producer of parts for commercial vehicles, including wheels, brake drums, fifth wheels, and landing gear for trucks and trailers. Practically all of its castings output goes into the manufacture of these products.

Until recently the foundry used three manually loaded furnaces to anneal or normalize castings. Although these three furnaces did an effective job, they did not have the capacity to handle increased production.

The Requirements — Company engineers decided that instead of adding one or more furnaces to meet the heavier work load, they could get more work out of two new furnaces if two conditions were met: The furnaces must provide quicker material handling; and some system would have to be worked out to transport castings quickly and easily back and forth from the furnaces to other parts of the foundry.

The first requirement was met by installing two new car bottom furnaces, each with its own car and both served by a single transfer car. These furnaces were installed so that they face each other, and the transfer car moves on rails between the two to feed either furnace.

The second requirement was met by running a track from the two annealing furnaces down the center of the building for about 100 feet. This arrangement permits

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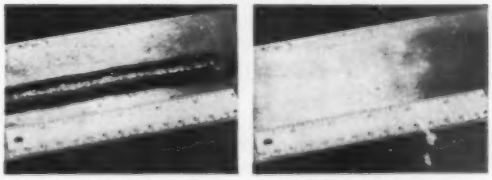
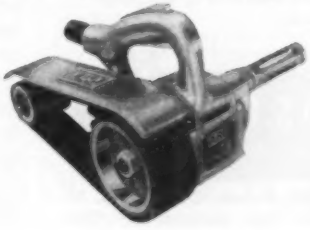


1 Take a rough 6" weld like this. Put a powerful Aro Belt Grinder on the job, and take the grind out of grinding! Full 2 H.P. air motor running at 6000 R.P.M. produces 7000 S.F.P.M. Belt speed—you hog and finish in one operation.

2 Here's the result just 1¼ minutes later, using a 24-grit belt. This is typical of the outstanding performance you can expect from the new portable Aro Belt Grinder—only tool of its kind—unbeatable for grinding performance.



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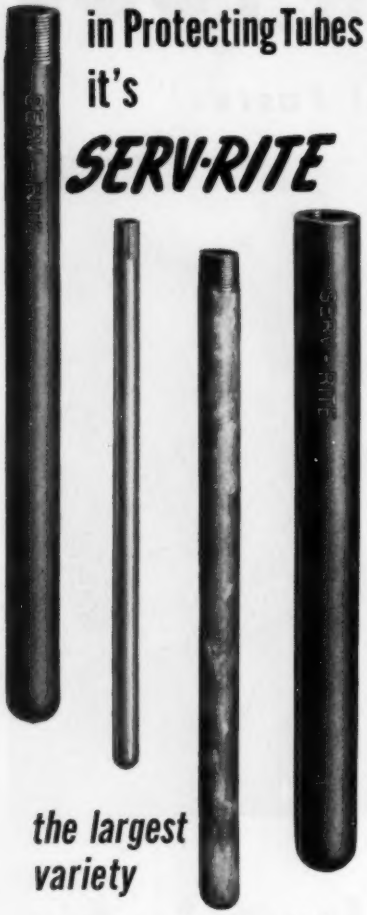

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Circle 684 on Page 55

transfer of castings to the annealing furnace and to the cleaning department without the necessity of unloading parts from the car.

Dayton Steel worked with the local distributor of Plibrico Co., Chicago, in designing the furnaces and in laying out the specifications to integrate the furnace sizes, capacities, and cycles with the foundry production facilities for maximum efficiency.

The Results — The advantages from the new arrangement began to pay off immediately. According to Fred Fensel, plant engineer, "We now get more production from the two car bottom furnaces than from the three hand-loading furnaces we used before. Labor requirements are down, too. After installation of the furnaces and track we were able to divert three men formerly engaged in loading and unloading furnaces to more productive work in the shop.

"One of the reasons for this, in addition to the much improved handling, is that castings can be removed from the furnace more quickly than before. Trucks usually remain in the furnace for about 2 hours and 45 minutes at a temperature of about 1700° F. When the heating period is over, castings can be removed by pulling out the car whenever convenient. The older furnaces first had to cool before our employees could stand the heat.

"Because the entire ends of the furnaces are opened to room temperature during unloading, it is important that the refractory lining be able to withstand the shock of sudden temperature drops caused by relatively cool air rushing inside. In the year and a half that the furnaces have been in operation, the lining has held up very well and maintenance costs have been low."

Furnace walls and arches are lined with a Plibrico cast-in-place refractory which forms a one-piece lining when installed. It is backed up by 4 inches of mineral wool, high-temperature block insulation, and is held securely in place by heat-resistant alloy anchors fastened to the furnace steel shelves and firmly imbedded in the refractory. Joints are eliminated, accounting for the low maintenance that has been required on these furnaces.

The car bottoms are lined with another cast-in-place monolithic refractory having extremely good abrasion-resistant characteristics.

Physical damage to furnace walls and cars as a result of rough usage, some of which is inevitable, is repaired easily by removing any severely damaged wall segments and patching with new lining material, cast in place. Usually, however, the only damage that occurs is a slight groove in the lining caused by a casting scraping against the wall when the loading car is removed.

Handling Simplified—The track leading from the furnace area to other parts of the foundry has cut sharply the problems of handling castings between the cleaning, blasting, and annealing operations. Castings first are sent to cleaning tables where they are prepared for heat treatment. Then they are loaded onto a car from one of the furnaces. The furnace car next is rolled onto a transfer car and both are taken to the furnace, where the furnace car is rolled off the transfer car directly into the furnace.

After treatment, the furnace car is removed and returned to the transfer car. Both are then moved about halfway down the track to the blasting machine, where the castings are removed and blast cleaned. The furnace car continues on its way to the cleaning tables for another load.

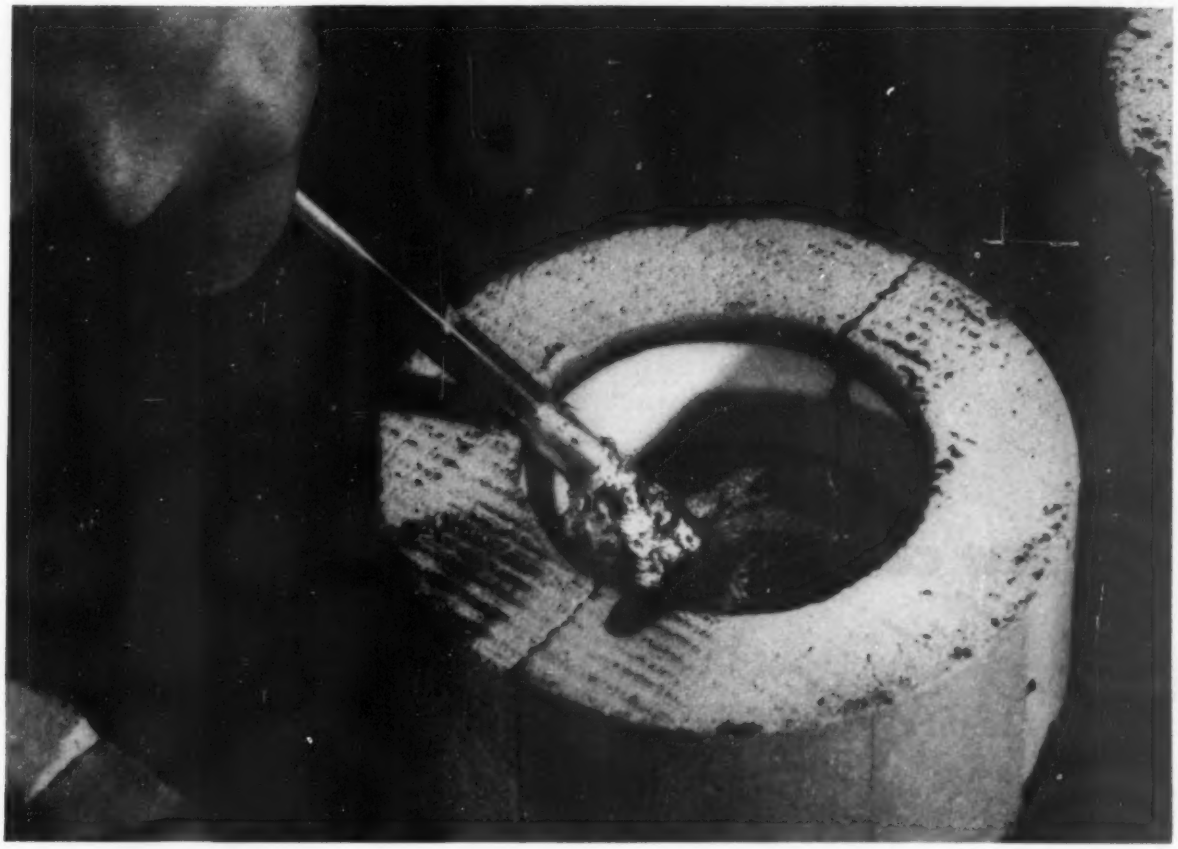
To insure that both furnaces are used simultaneously, three furnace cars are employed—two in the furnaces while the third is delivering and picking up the next batch of castings.

In a plant with a floor area of approximately 275,000 sq ft, this system has more than paid for itself in increased productive capacity and lowered material handling costs.

Future expansion is simplified by having the two furnaces so arranged that two more can be installed when needed, without major modifications to the building or existing machinery. Then, by extending the track, they can be tied into the existing rail network.

Represents Ajax Electric

Ajax Electric Co., Philadelphia, has appointed Egloff & Graper Inc., 1798 Industrial Way, Los Angeles 23, Calif., to be its sales engineering agents in southern California.

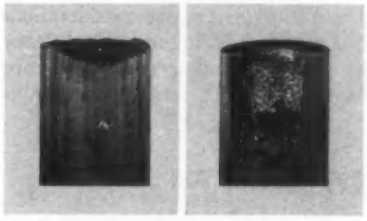


Riser metal stays molten twice as long with J-M RIS-A-SLEEV

THE INSULATED RISER SLEEVE FOR NON-FERROUS METALS THAT ASSURES UNIFORM FEEDBACK TO EVERY PART OF THE MOLD

Now you can get perfect finished castings every time with Johns-Manville Ris-A-Sleev®, the new riser sleeve that cuts heat transfer in half. The heat is contained *in the sleeve*, keeping the metal molten twice as long as the most effective competitive product. This allows more time to complete feed-back.

Ris-A-Sleev's more effective insulation serves to reduce the size of the risers, thereby giving you closer control of solidification. What's more, smaller risers mean a big reduction in cut-off waste. The following photographs graphically demonstrate Ris-A-Sleev's superiority over a leading competitive product.



Under identical test conditions, brass pourings were made with a Ris-A-Sleev and an ordinary riser sleeve. Note how riser metal from the mold equipped with a Ris-A-Sleev (left) has solidified uniformly with very little concavity, indicating uniform feedback to mold. Then note how the riser from mold using competitive sleeve (right) has cooled quickly around circumference, while center of riser stayed molten, resulting in pronounced concavity and uneven feedback.

Try Johns-Manville Ris-A-Sleev and discover the economic way to improve bronze, brass and aluminum castings. They are available in a complete range of sizes. For full information write Johns-Manville, Box 14, New York 16, N. Y. Ask for brochure IN-247A.

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Circle 685 on Page 55

Obituary

Edward M. Cabaniss, 75, until his retirement in May, board chairman, Joseph Dixon Crucible Co., Jersey City, N. J., died Sept. 27. With the company 36 years, he previously had served as vice president, executive vice president, and president.

B. A. Zikmund, 65, one of the founders of Calumet Steel Castings Corp., Hammond, Ind., died Sept. 13. He was president of the company when he retired two years ago.

Lester N. Shannon, 66, until his retirement last year vice president and a director, Stockham Valve & Fittings Inc., Birmingham, died Sept. 28. Mr. and Mrs. Shannon were killed in an automobile accident near Heflin, Ala. A native of Carbon Hill, Ala., Mr. Shannon joined the Stockham company in 1912, after graduation from Birmingham Southern College. He

LESTER N. SHANNON

was one of the organizers and first chairman of the Birmingham Chapter of the American Foundrymen's Society. While serving as a director of the AFS, 1936-39, and during his term as president, 1940-41, he helped to develop membership activity from 5 to 22 chapters. In

Mrs. LESTER N. SHANNON

1953 he was named president of the International Committee of Foundry Technical Associations, presiding over the International Foundry Congress in Paris.

Owen J. Pritchard, since 1957 executive vice president, Milwaukee Solvay Coke Co., Milwaukee, died Sept. 24. He joined the company in 1917.

Martin W. Pohlman, 63, executive vice president, Pohlman Foundry Co., Buffalo, died Sept. 7. He joined the company after graduation from high school, later becoming foreman, superintendent and

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M. W. POHLMAN

vice president. Mr. Pohlman was a former chairman of the Western New York Chapter of the AFS.

Barrington Hooper, 75, chairman of Industrial Newspapers Ltd., publisher of *Foundry Trade Journal,* London, died Sept. 2. He was president of the London branch of the Institute of British Foundrymen from 1939 to 1941, and was active in the Foundry Trades Equipment and Supplies Association.

Francis G. Frink, president, Washington Iron Works, Seattle, died Aug. 30.

Clarence H. Larkin, secretary-treasurer, General Foundry & Mfg. Co., Flint, Mich., died Sept. 18.

William J. Gallana, manager of the Alloy Sales Div., E. J. Lavino Co., Philadelphia, died Sept. 10.

John H. Castor, vice president-general manager, Ajax Iron Works, Cory, Pa., died Sept. 1.

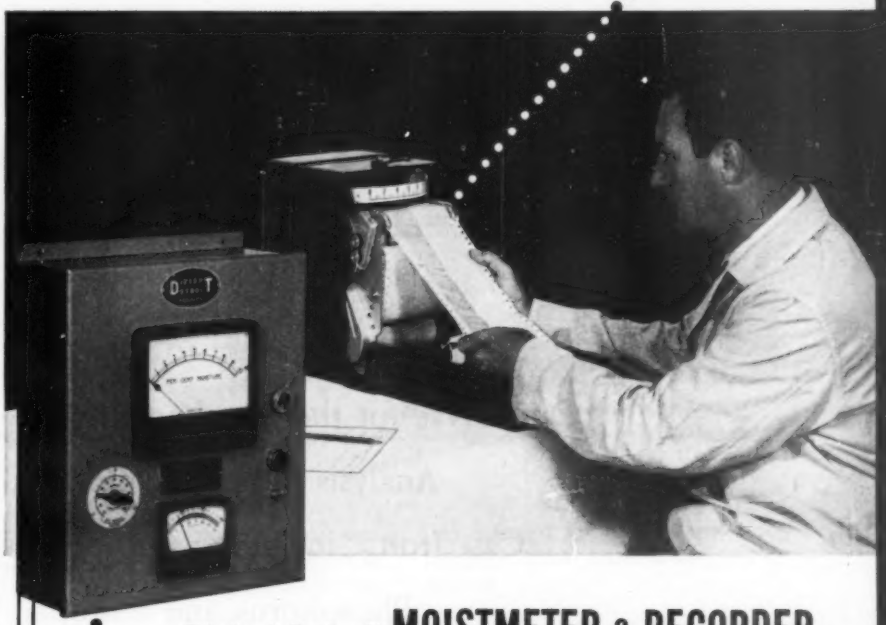
Book Review

***Machinery's Handbook,* 16th edition, 2104 pages, 4½ by 7 in. Published by the Industrial Press, 93 Worth St., New York 13, N. Y. Price $11.**

This latest edition reflects the rapid growth and accumulation of data in the mechanical industries, the large number of new American and British standards, changes in engineering and manufacturing practice, and the advances in new materials and alloys. These developments have required the incorporation of over 500 new pages and enlargement of the book by 192 pages.

Circle 687 on Page 55→

IN FOUNDRY 'LAB', FOREMAN'S OFFICE, OR ANY PLANT LOCATION.....



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Dietert-Detroit MOISTMETER & RECORDER provide an instantaneous, accurate and permanent record of the moisture of molding sand and indicates the temperature of sand while it is moving on a belt conveyor.

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Men of Industry

WALTER W. EDENS
. . . Allis-Chalmers research

NORMAN J. STICKNEY
. . . AFS Chapter chairman

HAROLD E. HENDERSON
. . . retires, Macaulay Foundry

CHARLES E. PETERSON
. . . becomes division mgr.

Walter W. Edens, supervisor of metallurgical research, has been appointed assistant director of the Research Div., Allis-Chalmers Mfg. Co., Milwaukee. He joined the company in 1952.

Norman J. Stickney, elected chairman of the Northeastern Ohio Chapter, AFS, for 1960-61, is eastern manager of sales and service, Sand Products Corp., Cleveland, covering Ohio and western Pennsylvania. Graduated in 1948 from the University of Wisconsin, where he was a Foundry Educational Foundation scholarship student, he joined Sand Products in 1950 after two years as instructor of metallurgical engineering at the university.

A. L. Gostow has been appointed general manager of forge and foundry plants, Chrysler Corp., Detroit, under a regrouping of manufacturing areas recently established by the company. Under his jurisdiction are Chrysler Foundry, Detroit Forge, and Winfield Foundry, Detroit; American Foundry, Indianapolis; Chrysler Casting, Kokomo, Ind.; and Forge Plant, New Castle, Ind.

John S. Smart Jr., general sales manager, American Smelting & Refining Co., New York, has been elected president of the Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers. He will take office next February, succeeding **Dr. Carleton C. Long,** director of research, St. Joseph Lead Co., Monaca, Pa.

Harold E. Henderson has retired as secretary and sand technician, H. C. Macaulay Foundry Co., Berkeley, Calif., after 42 years with the company. He continues as a director. Mr. Henderson started as a molder's apprentice with Macaulay at the age of 14, and also spent eight years as a journeyman molder in other California shops and in Australia. **Kenneth Hapgood,** who joined Macaulay this year as chief metallurgist, also has been appointed superintendent and sand technician. As superintendent he succeeds **Victor Henderson,** who has been made sales manager, succeeding **George McDonald.**

Lawrence Litchfield Jr., executive vice president, has been named president, Aluminum Co. of America, Pittsburgh. **Frank L. Magee,** who became president in 1957, is chairman of the board, succeeding **I. W. Wilson,** now chairman of the finance committee.

Anthony Demos recently joined Frank Samuel & Co., Philadelphia, Div. of Howe Sound Co., Salt Lake City, Utah, as manager of metallurgical sales. He was midwest sales manager, Foote Mineral Co., Philadelphia.

Charles E. Peterson, since 1957 manager of manufacturing operations, has been named manager of the Mackintosh - Hemphill Div., Pittsburgh, succeeding **J. R. Patterson,** formerly division vice president, who recently became president of E. W. Bliss Co., Canton, Ohio, the parent company.

Richard J. Hewitt has been appointed convention and exhibits manager, American Foundrymen's Society, Des Plaines, Ill. He was executive assistant manager and director of trade shows and conventions with Master Photo Dealers and Finishers Association.

R. J. Foresman, until recently vice president-sales and marketing, American Lincoln Corp., Toledo, Ohio, has been named a vice president, Michigan Abrasive Co., Detroit.

Thomas A. Marshall Jr., formerly senior assistant secretary, American Society of Mechanical Engineers, has been elected executive secretary, American Society for Testing Materials, Philadelphia. **Fred F. Van Atta** has been named treasurer. **Robert J. Painter,** formerly executive secretary and

KENDALL HERRON
. . . Alloys & Chemical Corp. changes

ROBERT L. HUMPHREY

L. W. DWORS
. . . Rotor Tool Co. appointments

RICHARD ALLCHIN

treasurer, will continue as consultant to the executive secretary, and **Raymond E. Hess** continues as associate executive secretary.

Kendall Herron, formerly Cleveland district sales manager, has been named eastern division sales manager of Alloys & Chemical Corp. **Robert L. Humphrey** recently joined the company as sales representative in the Cleveland home office. He was with Kaiser Aluminum & Chemical Sales Inc. as Grand Rapids, Mich., branch manager.

Frank C. Riecks recently joined Lester B. Knight & Associates Inc., Chicago, as senior associate, and will head a new office opened at 20111 James Couzens Highway, Detroit. Previously Mr. Riecks was design engineer, Timken Detroit Axle Co., Detroit, technical assistant to manager of foundries, Ford Motor Co., and vice president, Sutter Products Co., both of Dearborn, Mich. He is a former national director of the AFS and received an honorary life membership from the society in 1955.

Alfred J. Murrer has been named assistant factory manager, Gleason Works Inc., Rochester, N. Y. **Haerle D. Wesgate** has succeeded Mr. Murrer as superintendent of the foundry and pattern shop.

Kenneth H. Jones has been made New York district sales manager, J. O. Ross Engineering, Div. of Midland-Ross Corp., New York. He was in charge of the company's paper mill sales in the South.

James J. Keeley Jr. has been appointed eastern area sales engineer, Precision Castings Co., Cleveland. He will represent the company in New Jersey, Delaware, Maryland, and eastern Pennsylvania, with headquarters in Wayne, Pa.

Richard Allchin, director of marketing, has been named president, Rotor Tool Co., Cleveland, subsidiary of Cooper-Bessemer Corp., Mt. Vernon, Ohio. **H. P. Bailey**, founder and former president, becomes board chairman. **L. W. Dwors**, works manager, has been made vice president - manufacturing. **D. S. Linton** has retired as vice president and general manager of the company.

Stuart F. Cooper has been named assistant general sales manager, Cooper Alloy Corp., Hillside, N. J. He continues as sales manager of the Vanton Pump & Equipment Div., and will assist in sales direction of the Valve & Fitting, Foundry Products, and Marine Hardware Mfg. Divisions.

Fred S. Holway has been named assistant vice president, Castner, Curran & Bulitt Inc., subsidiary of Eastern Gas & Fuel Associates, Bos-

FRANK C. RIECKS
. . . joins Lester B. Knight

KENNETH H. JONES
. . . becomes district sales mgr.

JAMES J. KEELEY JR.
. . . Precision Castings sales

STUART F. COOPER
. . . assistant gen. sales mgr.

Hats Off to SMITH L-O CORE OIL

Foundrymen everywhere "doff their hats" to Smith L-O because here is a core oil that means *smooth going!* And that is a statement of fact. Smooth going with Smith L-O comes from the *controlled uniformity* of the grade core oil that is best suited to your operation. And that grade you require means a lot, too, and its use is based on the recommendation of the qualified Smith Practical Foundry Serviceman in your area. Call him in when you want assistance . . . it is his business to study your requirements and it's a habit of his to come up with the right recommendation. Yes . . . hat's off to Smith L-O —the name that stands for a service as well as a product.

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- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- ATLAS FOUNDRY SUPPLY CO. Santa Ana, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- BRUCE-CONREAUX CO. INC. Indianapolis 7, Indiana
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Smith L-O Core Oil

ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.

INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

Circle 689 on Page 55

WILLIAM H. WILKINS
. . . Geo. Sall Metals sales

ROBERT N. ECSEDY
. . . lubricant sales rep.

WARREN M. LOUCKS
. . . joins Thiem Products

ROBERT C. CROSSON JR.
. . . district sales mgr.

ton, with headquarters in New York. He was sales manager, Mystic Iron Works, and sales manager of foundry and industrial coke sales, New England Coke Co., subsidiaries of Eastern Gas in Boston.

William H. Wilkins, formerly with American Manganese Bronze Co., Philadelphia, recently joined George Sall Metals Co., there, as sales representative.

Carl Winkler has retired as president of Cleveland Standard Pattern Works Inc., Cleveland, after 47 years with the company. He started as an apprentice patternmaker and became president in 1958. **John F. Roth,** who has served as secretary-treasurer, and recently as vice president, succeeds Mr. Winkler. Mr. Roth joined the company in 1928.

Thomas J. Ault has been named president of the Automotive Div., the Budd Co., Philadelphia. Mr. Ault was with Borg-Warner Corp., Chicago, until 1958. Since then he served as president, Saco-Lowell Shops, Boston.

James F. McCartney has been appointed by McConway & Torley Corp., Pittsburgh, to co-ordinate sales activities of the company's district offices. He was with Pressed Steel Car Co., Chicago, and Duff-Norton Co., Pittsburgh.

D. P. Dorman, recently southern California sales representative for Cleveland Process Corp., Cleveland, has been appointed western sales manager, with offices in Hollywood, Calif.

Robert N. Ecsedy recently joined New York & New Jersey Lubricant Co., New York, as sales representative in Connecticut and southeastern New York.

Warren M. Loucks has joined Thiem Products Inc., Milwaukee, as sales engineer in western Pennsylvania, with headquarters at the Greenville, Pa., plant.

Robert L. Walker, formerly coordinator of engineering sales operations, Cleco Div., Reed Roller Bit Co., Houston, has been named manager of the division.

Arnold J. Herrmann, since 1955 executive vice president, American Cast Iron Pipe Co., Birmingham, retired recently. He joined the machine shop in 1914, later entering the sales department. After managing the Kansas City office for 21 years he became assistant general sales manager, and later vice president in charge of sales.

Harold V. Engh Sr. has been elected board chairman, and **Harold V. Engh Jr.,** president and a director, Turner Corp., Sycamore, Ill., the former Turner Brass Works.

John K. Bybee has been named southeastern agent, Ampco Metal Inc., Milwaukee, at the company's new office in Decatur, Ga. A former district manager for Ampco, Mr. Bybee joined the company in 1939.

Richard J. Farnum and **Edwin P. Montague** have been appointed sales engineers, Atlas Copco Pacific Inc., San Carlos, Calif.

Robert C. Crosson Jr. has been appointed Detroit district sales manager, North American Refractories Co., Cleveland. He was Philadelphia area representative.

James R. Whitlock has been appointed manager of the aluminum branch sales office in Louisville, Ky., Olin Mathieson Chemical Corp., New York, succeeding **Curt D. Hoffman,** who has been transferred to the aluminum sales office in Los Angeles.

C. J. Langley has been appointed assistant district manager in Philadelphia, Air Reduction Sales Co., Div. of Air Reduction Co., New York. **D. F. Bovie** has been named assistant manager of engineering services in the Pittsburgh district.

Albert H. Foster, formerly a vice president of Lester B. Knight & Associates Inc., Chicago, has joined Ebasco Services Inc., New York, as a general management consultant.

Clayton F. Devine has joined Ottawa Silica Co., Ottawa, Ill., as executive vice president. He was with the Silica Sand Traffic Association of Illinois.

Edward A. Puchalski has been named sales manager, Milwaukee Crane Div., Novo Industrial Corp., Cudahy, Wis. He joined the company in 1952.

Dar G. Johnson Jr., assistant general sales manager, Electric Steel Foundry Co., Portland, Oreg., has been transferred to Los Angeles as manager of sales, mill products, for Esco-Southwestern. **Robert Zwald**

CHARLES E. HANEY

A. HERBENER

The pictures of Mr. Haney and Mr. Herbener were inadvertently transposed in the October issue. Mr. Haney was named a vice president of Electric Steel Foundry Co., Portland, Oreg. Mr. Herbener was appointed Pittsburgh district sales manager of Union Carbide Metals Co., Div. of Union Carbide Corp.

becomes assistant to the general sales manager. **Jack McNally** succeeds Mr. Zwald as advertising manager. **Paul Fillinger** takes over Mr. McNally's duties as manager of product promotion.

Donald A. Anderson has been named New York district sales manager of the Jack Division and Coffing Hoist Division, Duff-Norton Co., Pittsburgh. He was district sales manager for company operations in upstate New York and New England.

Gerald H. Dettman has been appointed Chicago district sales engineer, Bohn Aluminum & Brass Corp., Detroit.

R. S. Wahl has been appointed Cincinnati district manager, Sipi Metals Corp., Chicago.

R. S. WAHL
. . . Cincinnati district mgr.

Leroy Fink has been made manager of the analytical department, Electric Steel Foundry Co., Portland, Oreg., in addition to his duties as supervising metallurgist-operations. **Laurence J. Venne**, assistant to the vice president-metallurgy, will also manage the radiographic department.

Fred J. Killmeyer Jr. recently joined Union Chill Mat Co., Saxonburg, Pa., as general manager. He was with Englander Co., Chicago.

W. A. Crowder recently joined Lehigh Fan & Blower Div., Fuller Co., Catasauqua, Pa., as representative in central and western Washington, and Alaska.

Robert M. Palmer, formerly manager of the Eastern district sales office, Hevi-Duty Electric Co., Milwaukee, has been named field sales manager of the company.

Donald J. Wallace has been appointed Chicago district sales manager, Coffing Hoist Div., Duff Norton Co., Pittsburgh. He was New York district sales manager.

T. J. Pohl has joined M. H. Detrick Co., Chicago, as sales manager for its insulation division there.

Norris B. Green has joined Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, Ohio, as Southwest district manager, with headquarters in Houston.

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IMMEDIATE DELIVERY
Circle 690 on Page 55

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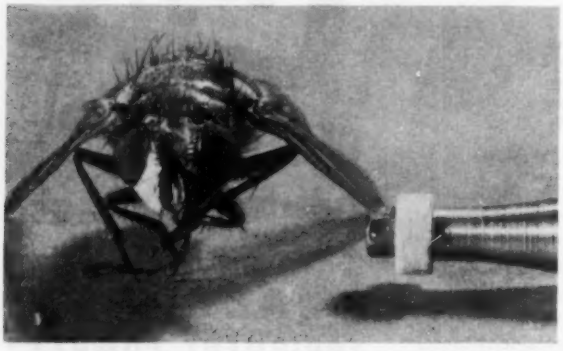
Circle 691 on Page 55

The Shakeout

Tiny Demountable Grinding Wheel Cuts Costs

MINIATURE GRINDING WHEELS now are being made in demountable types by Bay State Abrasive Products Co., Westboro, Mass., to cut costs of manufacturing tiny ball bearings for high speed cameras, tape recorders, missile guidance systems, and other small instruments. Formerly, the small grinding wheels



were bonded to shafts and the whole assembly was replaced when they wore out. With the new, demountable wheels, the shaft is left in the machine and only the wornout wheel replaced. Costs are cut 75 per cent because the wheel without the shaft is less expensive. In addition, replacing only the wheel is much quicker than replacing a wheel-shaft assembly. The demountable wheel is changed by removing the nut on the end of the shaft. Miniature wheels have been developed to be used at speeds up to 40,000 rpm.

For More Details Circle No. 517—Page 55

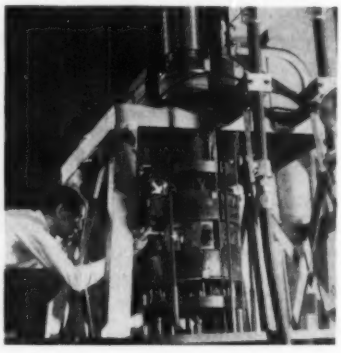
High-Speed Grinder Pays for Itself

ADOPTION of an air-powered grinder designed to rotate at 18,000 rpm saved enough at Mid-Continent Steel Castings Corp,. Shreveport, La., that it paid for itself in eight months. The new grinder replaces a 12,000-rpm model which was proving itself adequate for use with a 3-in. cone wheel. But when 2-in. wheels were adopted for better accessibility, it was found necessary to use higher speed grinders to maintain production rates.

More exacting production standards led Mid-Continent Steel to use the smaller wheels to finish low alloy steel castings for gears, brake and cable drums, steering knuckles, axle clamps, and other uses. The grinders are manufactured by Ingersoll-Rand Co. and weigh 7¾ lb each. The 50 per cent increase in speed has resulted in a like increase in production with the 2-in. grinding wheel.

For More Details Circle No. 518—Page 55

Arc-heater May Melt Refractory Metals



AN ARC-HEATER developed by Westinghouse Electric Corp., Pittsburgh, Pa., to be used as a high-temperature air supply for study of missile re-entry problems may have a use as a means to melt metals with high melting points. The heater can raise the temperature of a gas passing through it to as high as 20,000° F with very little contamination.

Two doughnut-shaped rings placed horizontally one above the other provide the electric arc. These rings are water-cooled, and a rotating magnetic field forces the arc to move around their circumference so that they remain sufficiently cool to prevent gas contamination.

For More Details Circle No. 519—Page 55

Washing Machine Agitators Now Are Diecast

DIECAST washing machine agitators are being produced by Meta-Mold Aluminum Co., subsidiary of Dayton Malleable Iron Co., Cedarburg, Wis. A three-piece steel die weighing 1200 lb was developed to make the diecasting. Die steel made by Allegheny Ludlum Steel Corp., Pittsburgh, is used in the die, which is 17 in. long and 18 in. in diameter. During the casting cycle, the segmented die moves into a chuck or die retainer also made by Allegheny Ludlum.

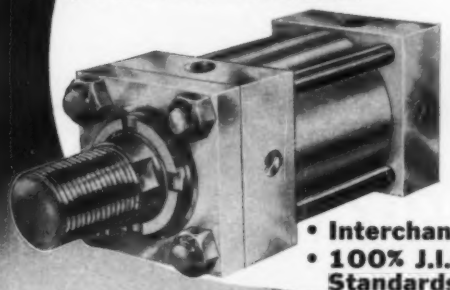
Agitators were produced previously by another process, but diecast agitators are said to be better looking and to need only one-third of the operations required before. Only simple turning and belt sanding are used to finish the diecasting.

For More Details Circle No. 520—Page 55

For Smooth, Precise, Sure Power

HIGH-PRESSURE HYDRAULIC CYLINDERS

2000 PSI
(3000 PSI non-shock)



- **Interchangeable**
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12 Bore Sizes: Compact 1⅛" thru 12"

Quick-Change Front Removal Cartridge

Self-contained unit externally removable, no need to loosen tie rods or dismantle the cylinder.

Interchangeable Cushion Check and Adjustment

For maximum flexibility; space-saving flush design; easy to adjust.

"Clinch-Tite" End Seal

Maintains leakproof seal at all pressures, ends "O" ring extrusion at pilot fit.

Heli-Coil® Piston Lock

Easy rod service with no loss of thread strength; meets rigid aircraft standards.

A-767A

MORE POWER from line air with S-P BOOSTERS

For *intensified* hydraulic pressure that you can control for punching, riveting, clamping, pressing, shearing, crimping—add an S-P Air-Oil Booster to your air line—no maintenance, no pumps, no valves; saves space, uses line air to hold intensified pressure as long as desired. Write for Catalog 116.

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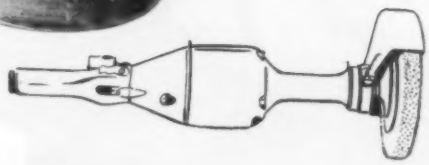
Circle 694 on Page 55

NON-FLUID OIL INCREASES AIR TOOL EFFICIENCY

Ordinary oil separates from water



NON-FLUID OIL TRADE MARK REGISTERED

emulsifies with water

There is good reason why leading air tool manufacturers specify "NR" Grades of NON-FLUID OIL for initial run-in after assembly and recommend its continued use. They know that NON-FLUID OIL provides trouble-free lubrication while automatically protecting pneumatic tools against rusting, sticking and excessive wear.

Unlike ordinary oils and greases, "NR" Grades of NON-FLUID OIL absorb ever-present moisture in compressed air into the lubricant. Thus, despite air moisture content you are assured of perfect lubrication and complete protection against rusting, gumming or sticking.

When you lubricate air tools with "NR" Grades of NON-FLUID OIL, tool speeds automatically increase from 10% to 30%. You make the test. Write for free testing sample and Bulletin No. 550.

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Also represented in principal industrial centers, including Pittsburgh, Pa., Cleveland and Cincinnati, Ohio.

NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture. So called grease imitations of NON-FLUID OIL often prove dangerous and costly to use.

Circle 695 on Page 55

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Here skilled hands carefully pilot your patterns through every operation performed on them . . . using the latest methods and finest equipment.

Unvarying high quality is maintained in both metal and wood patterns through careful layout and frequent inspections . . . and it is on such quality that City Pattern Foundry & Machine Co., Inc. has built its reputation.

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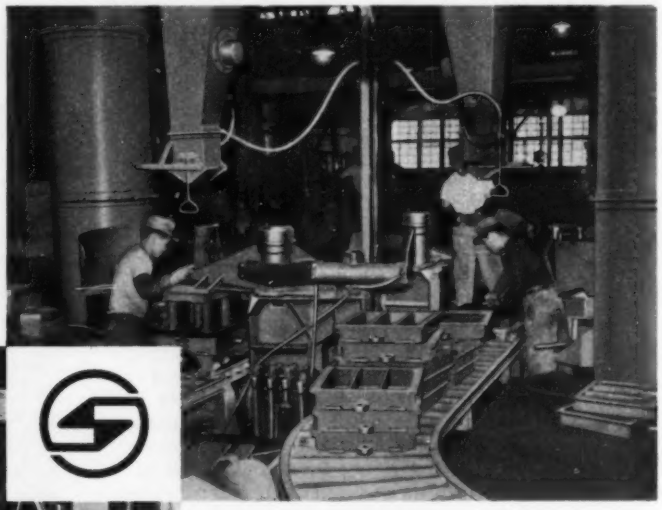
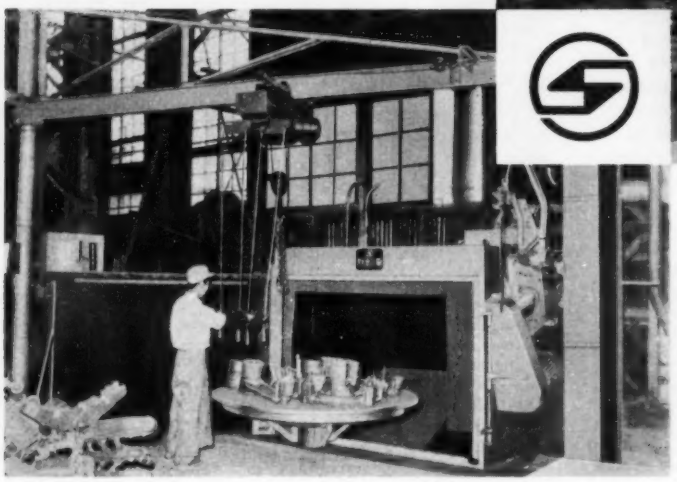
Circle 696 on Page 55

Progressive Foundries Specify SINTOKOGIO Equipment





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Circle 697 on Page 55

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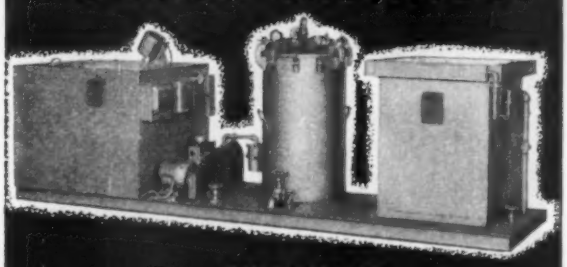
POROUS CASTINGS!



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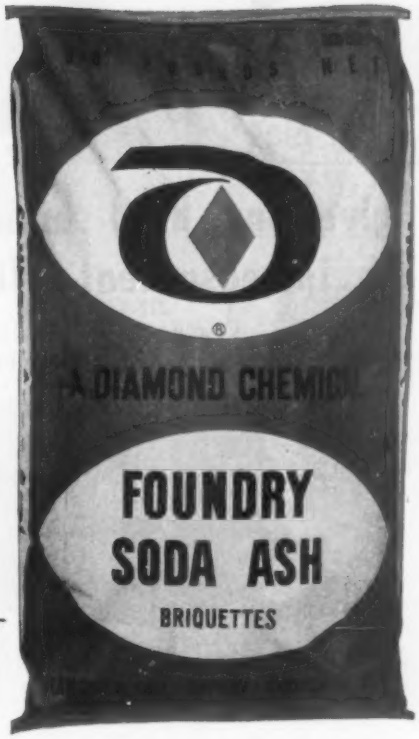
Circle 698 on Page 55

NEW



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for fast, efficient, desulphurizing action

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Diamond® Chemicals

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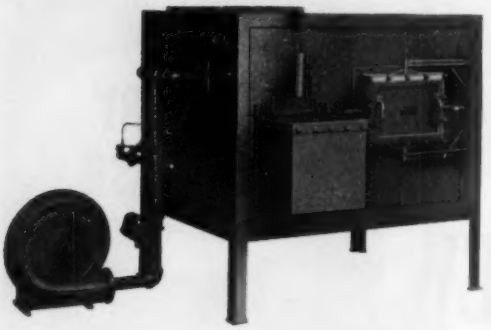
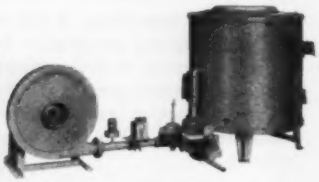
give long, hard service ...increase heat efficiency

1300-lb. capacity— in just 36 sq. ft. of floor space!



REVERB-O-MELTER, reverboratory aluminum melting furnace, available in either stationary or tilting types, gas-fired. Separate charging and ladling buckets allow simultaneous operations, built-in access door for fluxing and puddling. Used for die casting, permanent mold casting, conveyorized production of small sand castings.

Tangential firing— no crucible hot spots!



Rugged crucible and pot type, stationary melting furnace, for melting at temperatures up to 2200° F. in graphite crucibles. Gas or oil fired; adaptable to manual or automotive temperature control as well as flame safety equipment. For melting non-ferrous metals: copper, brass, bronze, gold, silver, etc.

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Circle 700 on Page 55

Circle 703 on Page 55

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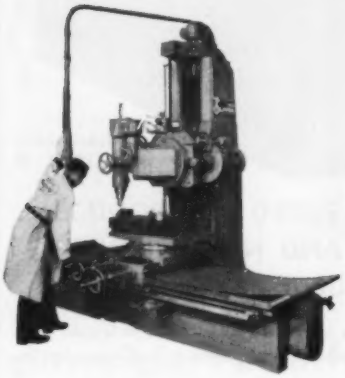

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Adapts easily to cutting wide variety of materials in pattern production. Fine design provides ease of operation. Built to assure maximum rigidity and high accuracy. Complete details and specifications upon request.

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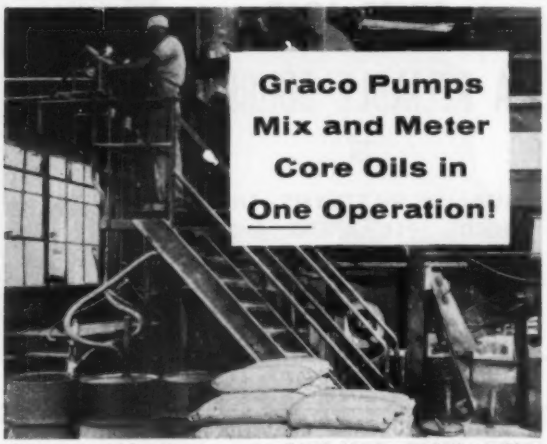
Circle 704 on Page 55



Graco's Fast-Flo Pumps can increase the efficiency of liquid handling operations. As photo shows, core oils and additives are being selected by foundry worker. They'll be transferred in regulated amounts, then mixed with sand in metered quantities. Pump uses air only when delivering fluids. Can empty full size drum in less than three minutes.

Send for more information about this amazing Graco Fast-Flo pump that's especially suited for modern fluids handling. The economical Fast-Flo can transfer, agitate and dispense. Use it as a supply pump, for mixing or spraying. It handles fluids as thin as alcohol, as thick as glue. Here's the pump that can save you money.

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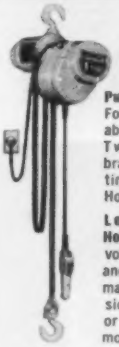
Circle 705 on Page 55

CUT YOUR COSTS ... let us help you save on every hoisting operation



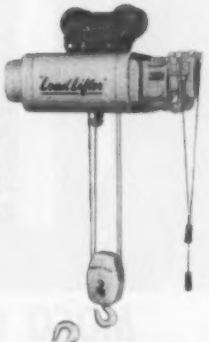
ELECTRIC HOISTS

Push Button Budgit Electric Hoist. For regular hoisting service. Portable. Hang up, plug in, and use. Two fully enclosed automatic brakes give fast, accurate spotting. ½-ton model lifts at 34 FPM. Hook suspension. ⅛ to 2 tons.

Load Lifter Wire Rope Electric Hoists. ½ to 15 tons. Safe 24-volts at the push-button. Single and 2-speed control. Two automatic brakes. Lug or hook suspension; also with push, hand-geared or motor-driven trolley. Hi-hook model, too.

AIR HOISTS

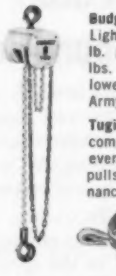
Budgit Air Hoist. Link and roller chain types. Pendant cord control. Speeds infinitely variable to 75 FPM. Rigid mount push trolley available. Safety hooks standard. ¼, ½ and 1 ton. Also Load Lifter Air Hoists with wire rope load line to 15 tons.

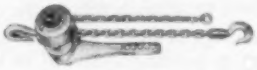


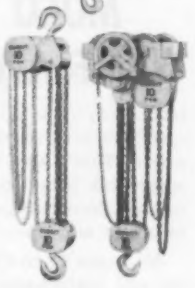
CHAIN BLOCKS

Budgit Chain Blocks. ¼ to 10 tons. Light, tough aluminum frame. 25 lb. pull on hand chain lifts 500 lbs. Fast action load brake makes lowering easy. Hook suspension or Army type trolley.

Tugit Lever-Operated Hoist. Light, compact, portable. Easy to operate even in close quarters — lifts or pulls at any angle. A fine maintenance tool. ¾ to 3 tons.

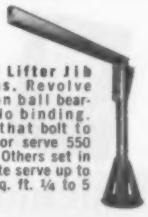






BUILD-IT-YOURSELF CRANE ASSEMBLIES

Budgit Crane Assemblies. Low-cost "build it yourself" kits to construct single girder cranes up to 6 tons and 30 ft. span without special tools. You buy I-beam locally to save more. Packaged electric bridge drive adds efficiency. Kits also for 180° swinging bracket jib cranes up to 4½ tons, 10 ft. reach.



Load Lifter Jib Cranes. Revolve 360° on ball bearings. No binding. Types that bolt to the floor serve 550 sq. ft. Others set in concrete serve up to 1500 sq. ft. ¼ to 5 tons.

END YOUR LIFTING PROBLEMS

Phone your Shaw-Box Distributor for help in selection or write us direct for literature.

80L-TG

OVERHEAD HANDLING EQUIPMENT
Products of
MANNING, MAXWELL & MOORE, INC.

Shaw-Box Crane & Hoist Division • Muskegon, Michigan
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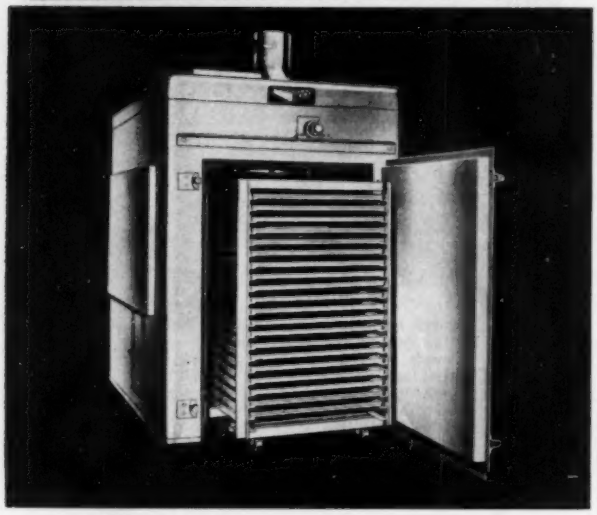
Circle 706 on Page 55

NEW TRENDS

CALL FOR

NEW METHODS



MOCO Ovens Keep Pace With Forward-Looking Foundries

Increased output at lower cost per unit is the result when you specify industrial ovens *custom-engineered* for your application. That's why Michigan Oven Company heat treating equipment is best for aluminum alloy processing. MOCO-engineered ovens are backed by years of technical research to insure maximum heat processing efficiency.

Michigan Oven Company is well-known for its engineering and craftsmanship in building ovens to fit the specific needs of manufacturers in the foundry industry.

Naturally, you won't want to miss any *sound* ideas on a better way to process your product. MOCO engineering has many of them. Wouldn't it be wise to investigate?

WRITE TODAY FOR FREE INFORMATION

This MOCO technical literature points the way to many cost saving ideas. Send for it today without obligation.

MICHIGAN OVEN COMPANY

MOCO

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DETROIT 1, MICHIGAN

Circle 707 on Page 55

HEAVY DUTY
MODEL K

SPECIALLY SUITED TO PRODUCE FERROUS AND NON-FERROUS LONG TUBULAR CASTINGS

Castings up to 32 inches in diameter and 20 feet in length. These machines are ideal for jobbing foundry work as well as production.

Cast tubes of all alloys of non-ferrous metal as well as cast iron, alloy irons, steel, alloy steels and stainless steels.

Highly efficient type of water-cooling for permanent molds.

Trunnion machines built in many size ranges for specific requirements.

Illustrated Folder No. 160 Available on Request.

CENTRIFUGAL CASTING MACHINE CO.
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SINCE 1919

A RELIABLE SOURCE

of

QUALITY PATTERNS, SHELL MOLDS, PERMANENT MOLDS AND DIE CASTING DIES.

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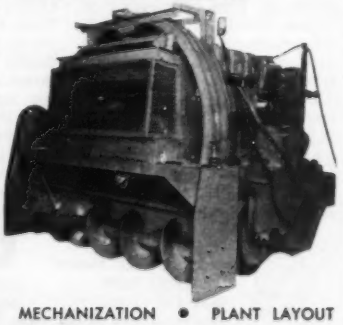
QUINCY, ILL. TELEPHONE: BA 2-0947

40th YEAR AT THE SAME STAND

Circle 709 on Page 55

IS ANTIQUATED SAND CONDITIONING ROBBING YOU? LEARN ABOUT THE RINGLIFT CONDITIONER!

Poorly conditioned sand cuts casting quality, increases rejects, loses customers. A Ringlift quickly provides sand conditioned much better than ever before. Picks sand off floor, cools, screens, aerates it. Magnetically separates metal. Moistens sand. Places it on floor in neat windrows. Send for the facts!



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Fort Wayne, Indiana

SAND PREPARATION • MECHANIZATION • PLANT LAYOUT

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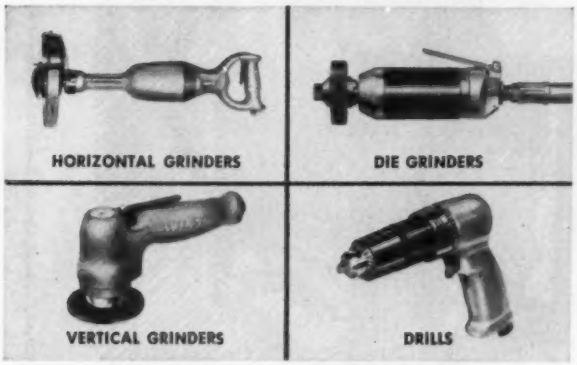
WILSON PORTABLE PNEUMATIC TOOLS



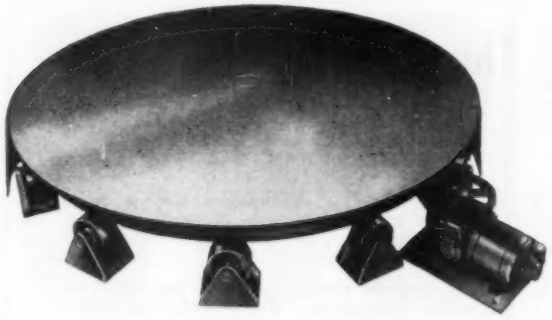
Lightweight • Powerful • Compact

All Wilson portable pneumatic production tools are designed for easy handling. These lightweight, compact tools are production time savers on a wide range of work. Catalog PT-58 gives all the facts. Write for your copy.

TW204

THOMAS C. WILSON, INC.
21-11 44th Avenue, Long Island City 1, New York
BETTER TOOLS FOR BETTER WORK

Circle 711 on Page 55



speed up foundry production with

CHASE TURNTABLES

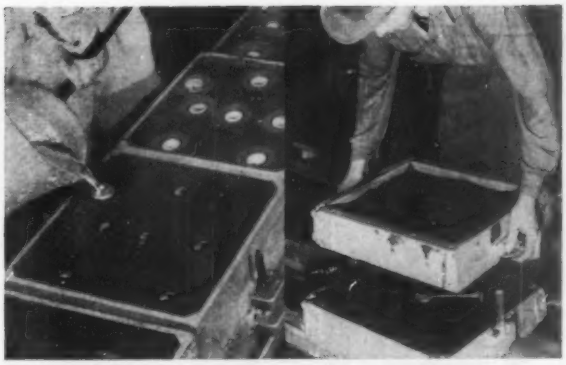
If you need to move or turn heavy materials 45°, 90°, 180° or as much as 360° during your foundry process, consider Chase welded steel turntables for the job. Ideal where hairpin turns must be made, as well as for automatic pouring of permanent mold castings.

Manual or power-driven—roller, caster or ball type available. Diameter and capacity to suit. Any style top—plain, rail, grooved, checkered. Rotating speed of power-driven turntables is flexible.

Write for catalog or send specifications for prompt estimate.

Chase FOUNDRY & MANUFACTURING CO.
2900 Parsons Ave. Columbus 7, Ohio

Circle 712 on Page 55



YOU IMPROVE YOUR CASTINGS

when you cast aluminum and magnesium with B&A® Alkali Fluoborates

(and Potassium Titanium Fluoride)

WHEN YOU CAST ALUMINUM

You can remove oxides and improve molten fluidity with B&A Potassium Fluoborate. It acts as a purifying flux and degassing agent . . . forms a dry dross.

You can produce a better grain structure in the casting by subsequent treatment with B&A Potassium Titanium Fluoride, or a mixture of Potassium Titanium Fluoride with Potassium Fluoborate (for lower melting temperatures). This improved grain results in increased tensile strength, greater elongation, better machinability, and other advantages.

WHEN YOU CAST MAGNESIUM

You can reduce rejects with B&A Alkali Fluoborates used as oxidation inhibitors with both green sand and core sand. You will also find cores easier to make and easier to shake out—and they collapse faster.

For further information, test samples, or technical assistance, write today on your company letterhead.

Allied Chemical
GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N.Y.

BAKER & ADAMSON® Fine Chemicals

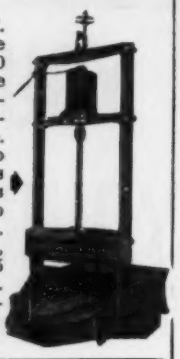
Circle 713 on Page 55

ACCURATE SCREEN-ABILITY

Combs Gyratory Riddles

"Greatest Name in Motion"

TYPE "CS". Complete price $435.00 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lbs, ⅓ H.P. enclosed motor.



TYPE "CR". Complete price $425.00. 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., 1/3 H.P. enclosed motor.

TYPE "HL". Price $315.00 complete, less sieves. Laboratory model especially designed for laboratory sand control, fitted with 1/6 H.P. enclosed motor.

PROMPT DELIVERY from your Foundry Supply House

TYPE "V". Price, 20" Sieve, $330.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. Height 4'6", weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity . . . Price $600.00.

MAIL THE COUPON NOW!

GREAT WESTERN MFG. CO.
Leavenworth, Kansas **Phone MU-2229**
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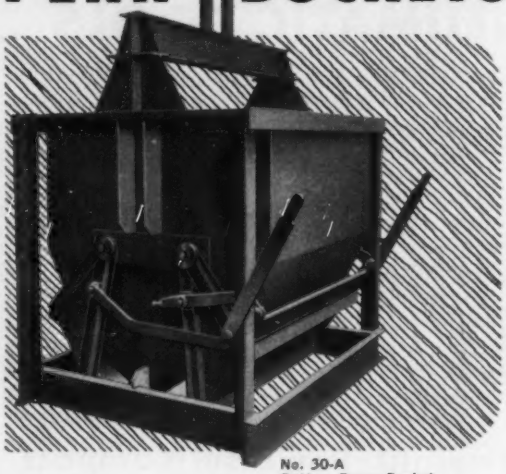
Circle 714 on Page 55

PENN BUCKETS



No. 30-A
Bottom Dump Bucket

Exclusive design makes this bottom dump bucket easy to operate . . . easy to open. Efficient for foundry use in handling all types of sand, moulding or core, dry or prepared. Can be used with coke, scrap iron and castings also. Sizes 7 to 200 cu. ft.

Write Today for Catalog • Prices Quoted on Application

PENN IRON WORKS, INC.
READING, PENNA.

Circle 715 on Page 55

The Cupola and Its Operation

A comprehensive text on cupola operation for the metallurgist, foundryman and student of foundry technology . . . . . .

The 35 chapters are grouped into the following sections: Operations, Equipment, Materials, Principles related to Operation.

Latest developments, such as hot blast, basic lining for nodular iron, and emission control are covered. Chapters such as those on refractories, principles of combustion, and metallurgy have been greatly augmented or are presented for the first time. More than 50 of the country's outstanding foundrymen have contributed their knowledge and experience to make this book available on cupola operation.

54 tables	Price:
300 pages	$11.00
8 x 11	Postpaid

FOUNDRY
Book Department
1213 W. 3rd St., Cleveland 13, Ohio

Circle 716 on Page 55

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

ROBESON PROCESS COMPANY

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GENERAL OFFICES: P. O. BOX 960, ERIE, PA. • PLANT: JOHNSONBURG, PA.

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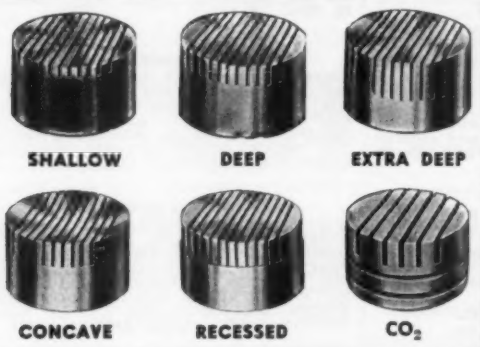

Slotted core box vents for every purpose. Inserting drill (right) ideal for inserting core vents. Special cleaning tool saves time.

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FERNDALE 20, MICH.

Circle 718 on Page 55

HARTLEY *Controls* CORPORATION • NEENAH • WISCONSIN

Originators of Fully Automated Sand Systems for Foundries

■ ■ ■ Full details will be sent promptly on complete systems • Sand Controls • Moisture Controls • Mixer Timers • Bond Feeders • Bin Controls • Mixer Selectors • Pneumatic Transporters

Circle 719 on Page 55

Use an Inquiry Card

For further information on anything described or advertised in this issue . . . . . .

SEE Page 55

CLASSIFIED ADVERTISING

• HELP WANTED

FOUNDRY SUPERINTENDENT

Needed immediately: An experienced, aggressive, inventive operating manager for nonferrous foundry (bronze and aluminum) located in Western Pennsylvania. Responsibilities include direction of 130 + Personnel, sand, permanent and centrifugal molding departments, coremakers, cleaning department, sand laboratory, powder metal manufacturing, etc. Strong metallurgical and mechanical background necessary. Salary open. Reply immediately by resume in confidence.

BOX 614, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

MAINTENANCE GENERAL FOREMAN

To head plant maintenance department in a leading Eastern steel foundry. Should have at least five years' experience in foundry or steel mill field and be well versed in modern day maintenance management techniques. Mechanical or electrical engineering graduate preferred but will consider others of proper qualifications. Position is one of real challenge, offers optimum opportunity and pays well. Send detail resume to: Box 601, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

$9,000 to $11,000

Young Engineer, interested in assured future with rapidly expanding, progressive foundry where competence is rewarded with advancement. Client assumes all expenses. Contact Bill Newell in confidence.

MONARCH PERSONNEL

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FOUNDRY EQUIPMENT ENGINEER

Large midwest foundry machinery manufacturer has opportunity for agressive design engineer with B.S.M.E. degree or equivalent. Actual foundry experience essential and applicant must be capable of sound original design with complete follow through. State experience, qualifications, education, age, salary requirements and references.

BOX 602, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

NONFERROUS FOUNDRY FOREMAN

Medium-size aluminum foundry near Cleveland, specializing in medium and large jobbing work. Must know all phases of foundry operations and aluminum alloys. In reply give age, experience and references. Address: Box 597, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PLANT ENGINEER

Thoroughly experienced in foundry design and layout. A major requirement is knowledge of modern material handling equipment and material flows. Degree is required and professional registration is an advantage. This is a real opportunity with an outstanding firm offering excellent salary and fringe benefits. Send complete information on education, work history and personal data. All replies will be held in the strictest confidence.

BOX 607, FOUNDRY

PENTON BLDG CLEVELAND 13, OHIO

SUPERINTENDENT WANTED

Long established gray iron foundry in the Midwest has excellent opportunity for ambitious graduate-engineer or metallurgist to take charge of plant. Must be under 45 and able to handle scrap reduction and labor. Address: Box 594, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PLANT MANAGER'S ASSISTANT

For cast iron plumbing fixture plant, needs rounded out fixture manufacturing experience, to back up manager. Address: Box 611, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Exceptional opportunity for graduate industrial engineer with a minimum of 3 years' experience capable of developing, machining and supervising a job cost system for the control of labor and process costs. Midwest steel foundry. Excellent working conditions. Salary commensurate with experience and background. Please furnish a complete resume of experience and education. All replies will be treated confidential.

BOX 625, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

TECHNICAL SERVICE

Metallurgical Engineer recent graduate or some experience in foundry or open hearth. Primarily to service ferro alloy users. Minor travel with headquarters in New York City. Salary open.

BOX 590, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

HELP WANTED

Experienced Gray Iron Foundry Foreman for jobbing shop, with thorough knowledge of all phases of foundry work. Please send complete resume. Address: Box 606, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

$12,000 TO $14,000

A once in a lifetime opportunity to associate with modern foundry. Will consider top assistant. Client assumes all expenses. Contact Bill Newell in confidence.

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SALES MANAGER

PRESENTLY SALES MANAGER OF HIGH ALLOY STEEL FOUNDRY. PREVIOUSLY ASSISTANT SALES MANAGER LARGE MIDWESTERN GRAY IRON, NODULAR FOUNDRY. SOUND TECHNICAL AND PRACTICAL BACKGROUND AS MOLDER, COREMAKER. SUPERINTENDENT, CHIEF METALLURGIST AND ADVERTISING MANAGER. ADDRESS: BOX 627, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

POSITION WANTED

B.S.M.E. 25 years' diversified foundry experience specializing in precision casting processes; shell molds, cores, investment, etc. Considerable selling, customer contact. Presently designing, building, selling shell core machines on west coast. Wants to join Foundry, Foundry Sales or Foundry Equipment Organization. Contact T. G. Baker, 824 Danville Hgy., Danville, California.

• POSITIONS WANTED

FOUNDRYMAN—FERROUS

Broad experience both in U. S. and European foundries. Experience covers consulting, management, operating and technical in gray cast iron, malleable cast iron, and cast steel. Available for short term employment, consulting or trouble shooting. Available to April 1, 1961. Reasonable salary or fee. Address: Box 620, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-ADMINISTRATOR

Experienced in administrative, costs and sales. Practical and technical training in Foundry operations. Address: Box 629, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON METALLURGIST

Experienced in acid and basic cupola melting, metal and casting quality control, age 49, available will relocate, mid-west. Address: Box 630, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Thirty-four years' experience, ferrous and nonferrous practical and technical, twenty years' supervisor. Prefer small shop. Now employed. Age 55. Address: Box 608, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION WANTED

Foreman with four years' steel foundry supervisory experience and two years industrial engineering experience desires position with a progressive foundry organization. Potential to move to superintendent. Address: Box 626, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

LICENSED STRUCTURAL ENGINEER

M.S., ten years' experience in design, detailing and construction of Steel Mill and Power Plants —foundations and multistory buildings, seeks design, drawing or field assignments. Address: Box 596, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

Young foundryman, with floor, machine molding and core room supervisory experience. Steel or iron, mechanized or otherwise. Green or dry sand molding. Versed in gating, risering, CO_2, cold set core making and production procedures. Will relocate. Address: Box 612, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES & SERVICE

MAN WITH BROAD EXPERIENCE IN STEEL CASTING SALES AND SALES MANAGEMENT. FAMILIAR WITH MACHINE SHOP PRACTICE INCLUDING COMMERCIAL GEARING. LOCATED IN PITTSBURGH, PA. AREA FOR PAST 13 YEARS. AVAILABLE ON SHORT NOTICE. ADDRESS: BOX 599, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

FOUNDRY ENGINEER

With wide experience in gating, risering, patternmaking and estimating and sand control desires position in Canada in patternshop or foundry staff. Address: Box 622, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MELTING SUPERVISOR

Steel foundry, electric arc and open hearth furnace, acid and basic practices. Carbon, Alloy, Stainless steels. Capable of taking full charge. This includes budget and incentive systems. Address: Box 619, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER

NOT A SUPERINTENDENT. Full experienced labor, sales, finance, general management. Heavy casting and machining background. $20,000 minimum. Address: Box 624, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN AVAILABLE

Competent and Progressive. Will relocate. Address: Box 617, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• POSITIONS WANTED

PURCHASING AND EMPLOYMENT

Experience: 3 and 13 years respectively in sound jobbing gray iron foundry averaging 150 people; full responsibility to purchase all supplies and raw materials; full responsibility interview-hire foundry employees; good improvements shown in both departments, made purchasing a profit job. Prefer East but other locales considered. Age 36. Now employed but not in foundry—want to smell some smoke again. Address: Box 631, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

With patternshop background and varied experience in engineering, gating, risering, scrap control and trouble shooting, seeks position where a talent for making the difficult easy and the impossible practical will be appreciated. Address: Box 623, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN OR GENERAL FOREMAN

Thorough knowledge of all phases of ferrous jobbing and production foundry operations. This includes budget controls and incentive systems. Experienced as supervisor in all departments. Address: Box 621, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

Twenty-five years of practical and technical foundry experience in ferrous and nonferrous metals. Light and heavy jobbing and production foundries. Manager and superintendent for the past eighteen years. Cost minded. Good trouble shooter, employed. Address: Box 609, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERVISOR—METALLURGIST

Young graduate metallurgist, experienced in gray iron and steel casting foundry practice, development, and supervision wishes to relocate to West Coast. Address: Box 593, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ESTABLISHED REPRESENTATIVE

WANTS—Pattern shop, Detroit area, capable of wood and metal jobs, 5 figures. I have good following. WANTS—Malleable foundry, and be exclusive agency in Detroit and southeastern Michigan. Technically trained. Ten years' sales experience pattern and castings. Address: Box 603, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Twelve years' experience, malleable and gray iron including supervision, melting, sand, quality control, gating, laboratory, heat treating. Competent to assume complete technical control of a progressive foundry. Minimum salary considered $10,000 year. Address: Box 598, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY METALLURGIST

University graduate. Ten years' experience in all phases of gray and ductile iron, acid, basic or neutral melting with unlined water cooled cupolas. Cost and quality minded. Now employed. Seek challenging position with progressive organization offering security and opportunity for the future. Address: Box 632, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• REPRESENTATIVES WANTED

SALES REPRESENTATIVE

For western New York area to sell foundry core oils, facing and supplies. Established territory. Adequate compensation to experienced man. Address: Box 591, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED

In your territory. From your desk you can earn a substantial addition to your income. Only written contacts with your clients! Write for particulars and further details to Verlag Karl Kuhne Publishing Co., Vienna 66, P.O.B. 128, Austria.

WANTED
SALES REPRESENTATIVES

Small Production Castings ½ lb. to 40 lbs. in Gray Iron—Brass—Bronze and Aluminum. For Pennsylvania, Maryland, Delaware, New York, New Jersey and Connecticut. Address: Box 618, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of
GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS
Confidential Inquiries Invited
From Employers and Qualified Applicants
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **FINANCIAL 6-8700**
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• CAPACITY WANTED

SHELL CAPACITY WANTED

For making stainless steel shell castings in 35-15 or 25-20 alloy. Rectangular tubing—average size 5" x 6"—3/16" wall with small flange each end. Please quote or write

BOX 600, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

• ACCOUNTS WANTED

SALES ORGANIZATION

With excellent reputation and potential customers desires to represent malleable, steel and gray iron foundries in Eastern Area from New York offices. Now handling forgings, aluminum sand and permanent mold castings and allied lines. Give complete details.

BOX 610, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

• FOUNDRIES WANTED

FOUNDRY WANTED

Established Manufacturer desires to associate with small or medium sized Aluminum Foundry in or around Akron, Ohio.
This association can be arranged through merger, outright purchase, or other arrangements suitable to both parties.

BOX 615, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

• WANTED-TO-BUY

WANTED TO BUY

1—HANDY SANDY—Model HS

1—REDDY SANDY with Vibrating Deck

BOX 628, FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

• FOUNDRIES FOR SALE

FOUNDRY FOR SALE

Fully equipped now operating gray iron foundry in Western New York State for sale. Due to illness and age present owners want to retire and settle an estate. Any reasonable offer considered.

BOX 613, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

• FOUNDRY CONSULTANTS

FOUNDRY CONSULTANT—NONFERROUS

Sand casting—permanent mold casting—centrifugal castings—in aluminum, brasses, bronzes, 30% leaded bronze—aircraft quality bearings and castings. Address: ED JENKINS, West Palm Beach, Florida. PHONE: TEMPLE 2-8685.

• FOR SALE

FOR SALE

El. lftg. Magnets: Ohio EC&M: Stearns: 29, 36, 50, 55 & 65"; Guaranteed. Alg. Shears, baling presses: all sizes.

H. GREENBERG PH. 194
BOX 163 **MURPHYSBORO, ILL.**

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to carry a complete line of "Hard Chrome Rebuilt Tools" at about half the cost of new tools. Before you discard your old tools, why not send them to us for our estimate on the cost of renewing them with our Hard Chrome Process?

CENTRAL PNEUMATIC SERVICE, INC.
512 LINDEN AVENUE
DAYTON 3, OHIO
PHONE: CL 2-2701

FOR SALE

1—Simpson #0 Muller—Style M (never used)
1—Simpson 18" Muller
1—Lancaster Mixer, Model EGB-4
1—Lancaster Mixer, Model EAG-3
3—Link-Belt Roto Louver Rotary Dryers, Models 207-10, 313-16 and 604-20.

R. GELB & SONS, INC.
U. S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

One Like-new Electric Arc Furnace Charging Bucket Including Bale

Type: Cable Operated—Clamshell
Capacity: 1486 Cu. Ft. = 55 tons
Max Dia Closed: 17'-9"
Max Dia Opened: 18'-8"
Max Dia Bottom Opening 12'-6"
Distance from Eye of Bale to Bottom of Bucket Opened and Closed: 14'-0"
Weight: 48,000 lbs.

BOX 592 FOUNDRY

PENTON BLDG. **CLEVELAND 13, OHIO**

• FOR SALE

FOR SALE

#70 B & P speedmullor with skipholst.
B & P stationary sandslinger with apron feeder.
B & P tractor type sandslinger.
Model 404 Clearfield sand mixer.
40" x 62" Herman jolt rollover draw molding machine.
(2)—24" x 30" plain jolt molding machines.
16" x 42" Roots blower with motor and V-belt drive.
10 ton geared ladle.
(2) gas fired rack type core ovens 60" x 15'-0".
Gas fired Despatch drawer type core oven.

LOVE BROTHERS—PYOTT

AURORA, ILLINOIS

SAND BLAST EQUIPMENT
SELL—BUY—TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

Specialized Wheelabrators and Pangborns converted to your requirements.

6' Pangborn Swing Table	$6000.00
Pangborn GF2 Air bbl.	$ 450.00
Pangborn 1GF Air bbl.	$ 350.00
Pangborn 53 EN-2 Hand cabinet	$ 325.00
Pangborn Auto Peening cabinet	$1100.00
48 x 48 Wheelabrator Tumblast	$3000.00
42 x 48 Wheelabrator Tumblast	$2000.00
27 x 36 Wheelabrator Tumblast like new	$4000.00
36 x 42 Wheelabrator Tumblast	$1500.00
20 x 27 Wheelabrator Tumblast	$2000.00
15 x 20 Wheelabrator Tumblast	$1500.00
27 x 36 Wheelabrator Rubber Belt	$3000.00
4' Wheelabrator Table Blast	$2000.00
6' Wheelabrator Table Room	$6000.00
4' Wheelabrator Table Room	$3000.00
6' American Tablast	$2200.00
Rumelin 8 x 8 room	$ 900.00
Pressure Tanks, all types	$150.00 up
Vapor Blast cabinets	$ 400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure Tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.
$100,000 worth of Wheelabrator and Pangborn Spare Parts Priced 25% to 50% Less List.

DIAMOND SALES, INC.
5654 W. JEFFERSON
DETROIT 9, MICHIGAN
VI. 3-6750

FOR
IMMEDIATE SALE
INDUCTOTHERM CORP. 50 K. W.
INDUCTION MELTING FURNACE
PURCHASED NEW AUGUST 1957

50 K.W. 3000 cycle equipped with a 50 lb. tilting furnace. Boaue vertical motor generator set. 75 H P. Motor 220/440 Volts—3 Phase. G. E. Motor Starter.

Condition Like New!

Capacity—55 lbs. steel in 35 minutes. Now in operation and we will demonstrate in our foundry at your convenience.

Replacement cost of this unit is $17,500 offered at $11,000 for acceptance by December 1.

L. E. JONES COMPANY, INC.
1200—34th AVENUE
MENOMINEE, MICHIGAN
PHONE: UNION 3-2181

FOR SALE

One 3000 lb. Stroman Electromelt Furnace used, complete without lining, oil burners, extra shell and 2-4000 gallon tanks. Price $3000.00 F.O.B. truck or car.
One Dings 45" Hy Duty Magnet.
One Cutler Hammer 18" Magnet.

SECURITY ALLOYS CO., INC.
3104-56 W. 49TH PLACE
CHICAGO 32, ILLINOIS

FOR SALE

One Model 3 Unit Drive Simpson Muller, with Bucket Loader. Double Discharge Hoppers, Mill Belt, Bucket Elevator, National System Aerator, 14 ft. long Prepared Sand Conveyor, 50 ton Sand Storage Bin. All in good condition. Address: Box 595, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• FOR SALE

FOR SALE

(1) Lima model 34 crane, with 35' boom, complete with bucket, magnet and generator—in excellent condition. New 1957.
(2) Prime Mover power wheelbarrows with dump bodies.
(1) Toledo Scale, #65 printweigh 60" x 60" platform used in cupola charging.
(1) Lt. #62 Towmotor, 7500 lb. capacity.
(1) Thor concrete breaker.
(1) 16 x 48 rotary positive Roots Connersville blower with Foxboro stabilog air weight control—new 1953.
(1) Link-Belt conveyor 52' long.
(1) Mayfran steel belt conveyor 40' long, 36" wide, new 1955.
(1) Homelite 3" gasoline powered pump, complete with hoses.
(2) IBM time clocks and racks.
(4) Machler core ovens.

DOSTAL FOUNDRY AND MACHINE CO.

2500 WILLIAMS DR., BOX 580

PONTIAC, MICH.

PHONE—FE 4-2507

FOR SALE

Whiting—#4 Cupola—complete w/Skip charger, blower, all motors and controls—good buy as a stand-by.
HOUGH PAYLOADERS—½ Yd Rebuilt.
MOULDERS FRIEND (2) one 60" and one 50" —both w/extra brushes—rebuilt.
MULBARO—B & P #3½—rebuilt.
TUMBLAST—American 48 x 72 w/loader and dust collector—can be seen under power. Also have 36 x 42 under power.

W. O. McMAHON

P.O. BOX 5799 **HOMEWOOD STATION**

BIRMINGHAM 9, ALABAMA

PHONES: TREMONT 1-2088 and 9-6170

USED LIFT TRUCKS

Because of volume sales of new Hyster lift trucks, Karry Kranes and Straddle Carriers, our dealers have a fine selection.

HYSTER AND
OTHER MAKES

All types of finance
and lease plans
Excellent delivery
Write — Wire — Phone
Used truck office — Dept. Q

HYSTER COMPANY

1140 SOUTH 25th AVE. **BELLWOOD, ILL.**

PHONE ESTERBROOK 9-3515

FOR SALE

#1 American Wheelabrator, Serial No. 101199 Multi Table; and Dust Collector Serial No. 101200. Excellent condition. Imperial Molded Products Corp., 2857 West Harrison, Chicago 12, Illinois.

FOR SALE

27" x 36" American Wheelabrator, Serial Number A63376. Address: Weldon F. Stump, 4835 Crestridge, Toledo 13, Ohio.

• FOR SALE

A NEW COMPANY

AN OLD NAME

EARL GREENE

Now Associated With
C. Greene Equipment Corp.
Handling Only Good Used
Foundry Equipment

Now Liquidating
The Cutler-Hammer Foundry
of Milwaukee, Wisc.

Consisting of

SPO Model 9546, Jolt, Rollover, Squeeze and Draw Machine
Fisher 300# Alum. Melting Furnace, gas fired, motorized noze
Molders Friend 60"
International Jolt Rollovers Model Type G, 30x8 and 24x10
International Type JSK7 Jolt, Squeeze, Stack Flask Type Unit
International Jolt Pin Lift Machines Type JDP, many sizes
International Core Blowers Model SB11 and Model SB13
International Plain Jolt Machines
Champion Core Blower CB10
Industrial Bridge Cranes Motorized 1 ton capacity 26' span
Ingersoll-Rand Cupola Blower, Cent. 5200 CFM, 20 oz. with 40 HP.
Ladles all sizes, geared
Bondactor Model 1000L
Tessmer Sprue Cutter
Charging Cranes, Monorail Type
Dust Collectors
Plus many other misc. items
In our regular stock
48 x 72" Tumblast Complete, Late
Simpson No. 1 UD Muller
Tabor Cut Off Saw
Pangborn Rotary Table Cleaning Machines 4 ft. and 6 ft. with dust collectors
Johnston & Jennings Jolt Strip—Model 812S Table 30x38
SPO Rollover Pattern Draw Model RD6815, Table 36x68
Davenport Jolt Rollover Model 34A, Table 36x60
Osborn Model 276J Jolt Squeezers
Steel Flasks, all sizes
Whiting Coal Pulverizers Model 30
Redford Core Blowers Bench Type
Demler Core Blowers, all sizes

Many more items available
Send us your inquiries. We are always interested in buying your surplus equipment

Remember

EARL GREENE

OF

C. GREENE EQUIPMENT CORP.

346 RIDGE AVE.

CLARENDON HILLS, ILLINOIS

(SUBURB OF CHICAGO)

FACULTY 3-4300

FOR SALE

$7,000.00 worth of pattern shop supplies, tools, machines (drillpress, disc sanders, lathes, saws, shaper). List on request. Sacrifice in bulk sale. Address: Thomas Schnorberger, CHerry 1-0320 Monroe, Mich.

FOR SALE

One Model TSM3-Gr. 16 Shell Process, Inc. gas fired single station shell molding machine in good condition. Address: Box 604, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• FOR SALE

FOR SALE

One Beardsley & Piper riddle type stationary sand slinger $1,500.00

BOX 605, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

• FOR SALE

FOR SALE

MOTOR-GENERATORS
TRANSFORMERS

Unused—Rebuilt

WORLD'S LARGEST INVENTORY

ELECTRIC EQUIPMENT COMPANY
Phone station Collect CL 4-9058
P. O. Box 51 — Rochester 1, New York

• FOR SALE

FOR SALE

One Electromelt Arc Furnace, size Q Type C 16—1½ tons, left hand, serial number 224. Allis Chalmers Transformer 1200 KVA, 2800 pieces new Furnace Brick, 1 lot 40 pieces 6" x 60" threaded electrodes, misc. spare parts including electrode holders, door, worm gear, roof ring, etc. Priced right for quick sale.

SECURITY ALLOYS CO., INC.
3104-56 W. 49TH PLACE
CHICAGO 32, ILLINOIS

CLASSIFIED ADVERTISING RATES

(Effective Jan. 1, 1960)

POSITION WANTED—Minimum advertisement set solid.

30 words or less $4.00
Additional words .....15c each.

ALL OTHERS—Help Wanted, Employment Service, Wanted-To-Buy, Representatives Wanted, For Sale etc. minimum advertisement set solid,

30 words or less $10.00
Additional words .....35c each.

NOTE: If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

Classified forms close the 13th of month preceding issue.

FOUNDRY

PENTON BUILDING CLEVELAND 13, OHIO

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Nine Times	Twelve Times
1 inch	$ 27.75	$ 26.25	$ 24.75	$ 24.00	$ 23.25
2 inches	54.00	51.00	48.00	46.50	45.00
3 inches	78.75	74.25	69.75	67.50	65.25
4 inches	102.00	96.00	90.00	87.00	84.00
5 inches	123.75	116.25	108.75	105.00	101.25
6 inches	144.00	135.00	126.00	121.50	117.00
7 inches	162.75	152.25	141.75	136.50	131.25
8 inches	180.00	168.00	156.00	150.00	144.00
9 inches	195.75	182.25	168.75	162.00	155.25
10 inches (1 col.)..	210.00	195.00	180.00	172.50	165.00
15 inches (1/2 page)	303.75	281.25	258.75	247.50	236.25
20 inches (2/3 page)	390.00	360.00	330.00	315.00	300.00
30 inches (1 page)	562.50	517.50	472.50	450.00	427.50

Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.

FOUNDRY LIQUIDATION

GRAY IRON FOUNDRY OF

PACIFIC CAST IRON PIPE & FITTINGS CO.

9400 Rayo St., South Gate, Calif.

Foundry and Pipe Tapping Equipment with a replacement value of over $1,000,000. Many Machines used less than 2 years.

3—COMPLETE SAND SYSTEMS
20 STA. MOLDERS HOPPER LINE
TACCONE DIAPHRAGM, MOLDING MACH.
HERMANN 1 & 3 STATION CENTRIFUGAL PIPE MACHINES
(7) MULLERS SIMPSON 2 & 3's, B & P #40
MOLD CONVEYORS
2—NEW SPO 2160R's
10—SPO 113J
BELT CONVEYORS

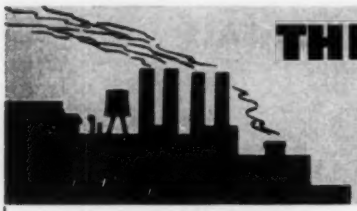
BUCKET ELEVATORS
STEEL FLIGHT CONVEYORS
PIPE WHEELABRATOR
CUPOLA DUST SUPPRESSORS
POTTSTOWN TAPPING MACHINES
LABORATORY EQUIPMENT
TYPE N ROTOCLONES
CUPOLA BLOWERS
458 CHAIN CONVEYORS
SAND STORAGE BINS

Write, Wire or Phone for descriptive list:
ADDRESS YOUR INQUIRIES TO:

Liquidation Office: ACME EQUIPMENT CO., INC.
9400 RAYO AVE. P.O. Box 391 SOUTH GATE, CALIF. PHONE: LOrain 6-6149

Headquarters Office: ACME EQUIPMENT CO., INC.
126 S. CLINTON ST. CHICAGO 6, ILLINOIS ANdover 3-3430

Circle 866 on Page 55



THE ACME bargain page

AERATOR
NEWAYGO

BLOWERS
I.-R. 12900 cfm, 100 h.p. 220-440 V. 20 oz.
GE 10500 cfm., 20 oz., 85 h.p., 220 V.
GE 7500 cfm., 20 oz., 89.6 h.p., 220-440 V.
SPENCER 7350 cfm., 16 oz., 50 h.p.
GE Centrifugal 6200 cfm., 24 oz., 58 h.p.
6000 cfm. INGERSOLL-RAND 32 oz.
SPENCER 3500 cfm., 28 oz., 40 h.p.
SPENCER 2250 cfm., 16 oz., 15 h.p., 220
SPENCER 1350 cfm., 32 oz.
NORTH AMERICAN 1050 cfm, 16 oz.
NORTH AMERICAN 850 cfm.
500 cfm. NORTH AMERICAN 12 oz.
McKee 200 cfm.

BUCKET ELEVATOR
33' Newaygo 12" x 7" Buckets
28' Newaygo 12" x 7" Buckets

CONVEYOR
17' BARBER GREEN Bucket Conveyor
30" x 25' Magnetic Belt Conveyor w/drives. 2 h.p., 220-440 V.

CONVEYORS, OSCILLATING
24" x 40' Ajax
SIMPLICITY 18" x 24'
SYNTRON 24" x 6'
AJAX 12" x 20'6"
36" x 11', Ajax
8" x 13' Ajax

CORE BLOWERS
CB15 55# cores, Universal blow plate
DEMMLER #4 up to 250# cores
DEMMLER #50
DEMMLER 2EO
DEMMLER 2K
FEDERAL "SAN-BLO" CB 40
INTERNATIONAL SB15H, up to 150# cores. Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
6—OSBORN 193 up to 50# cores
REDFORD #2 & #4

CORE GRINDERS
5—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

CORE OVENS
THERMONIC INDUCTION MODEL 1800A
2—Despatch ET. Drawer Type

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw
SUTTER #500

CRANES
P&H 5 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports
10 ton MILWAUKEE; 48' span, 220 V.

CUPOLA GUNS
1—Bondactor #1250 and 1000

DUST COLLECTORS
PARSONS 40,000 cfm. cloth bag type
ROTOCLONE W14 Arrang. A. 5200 cfm.

ELECTRIC MELTING FURNACES
1—DETROIT "LFA" 350# shell 13200 V.
1—DETROIT "LFC" 700# and 350# Tapered Shell 2300 V.

FURNACES
400# Fisher Motorized Tilt, Gas Fired
600# Fisher Stationary
600# Campbell Hausfeld Brass
ECLIPSE 2000# Skeinar Gas, cast iron, or alum.

GRINDERS, MISC.
U.S. #70 Comb. 20" disc & 20"x3"x1½" wh
GARDNER 18" single end disc.
HANCHETT 30" double spindle opposed
GARDNER 26" D.E. Disc
120A Gardner 30" Opposed Disc
Porter Cable BG 8 8" belt
72" Gardner Horizontal Disc
53" Hanchett Horizontal Disc

GRINDERS, SNAG
5—#6 FOX Single Wheel 24" Snag
U.S. #65 D. E. 30" x 3" x 12"
STANDARD 24 x 2½—15 HP DE Snag

GRINDERS, SWING FRAME
FOX 24" x 3" x 12", 15 h.p.
MARSCHKE 24" x 3" x 12" 20 h.p., 220 V.
U.S. 24" x 3" x 12" 15 h.p., 220-440 V.
2—MARSCHKE 3 h.p., 12" wheel
1—B&D 7½ h.p.

CUTOFF SAWS
DEWALT CUTOFF SAWS for ferrous or nonferrous metals, cutoff or as sprue cutters. Flush blade adaptor takes up to 20" abrasive blade or saw. Power Hoist to arm. Chain & sprocket cross feed for working on heavy cast iron 48" x 60" "T" slot table or off table cutting of large work. Motor swivels horizontal to vertical in yoke.

HEAT TREATING FURNACES
G. E. Elevator Type 1950° Atmosphere Generator 65" x 16' car. Electric, Late
G. E. Elevator type 2150°—96" x 144" car atmosphere generator, Electric, Late
LINDBERG 1250° 48 x 60 Electric
3—ABBOTT 24" H x 22" Deep x 30" Wide, Gas Fired
HOLDEN #202 1850° Bright Hardening Annealing
25 KW Westinghouse 2000°

HOISTS
6000# Cleveland, w/monotractor travel
6000# Electrolift
4000# Cleveland
4000# Ingersoll-Rand Air
2—4000# Lo Hed, 220/440 V.
4—2000# R & M
4—2000# Ingersoll-Rand Hoists
4—CLEVELAND 2000# Cab type hot metal carriers
1—500# Ingersoll-Rand LC-4

INDUCTION MELTING EQUIPMENT
100 KW-Ajax 300# 3000 cycle, 150 h.p. 4 bearings MS set, water cooled, complete controls
30 KW Lepel Spark Gap
35 KW Ajax Tama Wyatt, 60 cycle induction holding furnaces
1000# Ajax Spare Melting Furnaces

LADLES
WHITING 16000# Crane
WHITING 8000# Crane
WHITING 5000# Crane
4000# Industrial Holding

MOLD BLOWER
TACONNE TD4 24" x 32" flask

MOLD CONVEYOR
366'—51—44" x 66" cars

MOLDING MACHINES
JOLT SQUEEZE PIN LIFT
8—OSBORN 712 PJ 18" x 28" table
1—CHAMPION JSL10P 18" x 21" table 6" draw
8—MILWAUKEE 2646 Jolt Squeeze Strip rolloff—rolling molding machines 10" jolt cylinder; 1800# capacity, 26" squeeze cylinder; 13" draw, Flask size 25¼" to 29" wide, 52" long. FACTORY REBUILT
2—MILWAUKEE 165, 24" x 30", 8" draw

JOLT SQUEEZERS
2—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ
2—MILWAUKEE 244 Jolt Squeeze car type head
MILWAUKEE 181-7, 24" x 36" table
113 PJ SPO
25—124 Milwaukee Portable Jolt Sq.
6—104 Milwaukee Portable Jolt Sq.

JOLT ROLLOVER DRAWS
HERMAN 10000# late
HERMAN 3000#
2—750# HERMAN 20" x 30" table
1—INTERNATIONAL RJ 20" x 12"
1—SPO 9032
3—SPO 506
1—SPO 506 SP
2—INTERNATIONAL G
2—TABOR 30 x 52

JOLT SQUEEZE ROLLOVER DRAW
OSBORN 331-332-333
SPO 413D
INTERNATIONAL RES.

PLAIN JOLT
40" x 84" Herman
36" x 60" Herman

MULLERS and MIXERS
#30 B&[illegible] loader
1—#3 UD Simpson
1—930 Clearfield
CLEARFIELD #404
4—#2 SIMPSON OG
#1 Simpson OG
1½ Simpson Style "C"

SAND CONDITIONERS
AMERICAN 51"
ROYER NDC—ND2
SCREENARATORS S-M-L

SAND SLINGERS & EQUIPMENT
3—19"—2 speed Stationary
2—14' Turntables
1—12' Turntable
1—8' Newaygo Plate Feeder
4—7' B&P Plate Feeders, 35 & 45 Tons

SAND SYSTEM EQUIPMENT
33' Newaygo Bucket Elevator 12" x 7"
28' Newaygo Bucket Elevator 12" x 7"
4—7' B&P Plate Feeders, 35 & 45 Tons
2—18" x 52' Magnetic Belt

SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic

SHAKEOUTS
3' x 5' SIMPLICITY
3'x 10' SIMPLICITY
5 x 10 LINK-BELT
4 x 8 LINK-BELT
2' x 8' Double Deck

SHELL EQUIPMENT
SHELL PRODUCTS 20" x 30" pattern size w/shell blender and bonding press
TSM4 Shell Molding Machine 20" x 30"

SHOT BLAST
SLY #4, 20" x 30" w/dust collector

SLAG DISPOSAL UNIT
AMERICAN MODEL A

SPRUE CUTTERS
1—MILWAUKEE #85 TON
OBERMEIYER 2 H.P.

STRAIGHTENING PRESS
HYDRAULIC
225 ton Southwark
150 ton Farquhar "C" Frame
100 ton Elmes Hydraulic
100 ton Hannifin Hydraulic
60 ton Lempco 4 post
60 ton Farquhar "C" Frame
25 ton Fox
25 ton Dennison

TESTING EQUIPMENT
120,000# YOUNG Universal Tensile

ARLIN Automatic Rockwell, continuous
COLEMAN 55 Spectrophotometer
GOGAN Model 1414-2V
TINIUS OLSON Brinnel Hardness Tester Production Bench

TUMBLING BARRELS
ROTO-FINISH, Model DW 45-36
1—ROYERSFORD, 42" x 72", chain drive
SLY, 24" x 48"; 3 H.P.
SLY, 30" x 60" Duplex.

TUMBLING MILLS
30" x 60"

WHEELABRATORS
27" x 36" American w/skip
48" x 48" AMERICAN w/skip
6' Table PANGBORN
#1 Rotary Table, AMERICAN
20" x 27" AMERICAN, w/rubber belt
AMERICAN #2 Tablast 8-28" tables, late
PANGBORN GD1-Airblast Barrel

WOODWORKING—PATTERNSHOP
HERMANCE 24" Planer
JONES SUPERIOR 48" Double Disc
OLIVER #290 Dbl Arbor, Tilt-Arbor Saw
1—OLIVER 182D, 15" Disc Sanders
CRESCENT 24" Planer
ONSRUD W-244, W-240 & W-304 Routers
8", 12", 20" and 30" Jointers
20" Yates American Band Saw
36" American Band Saw

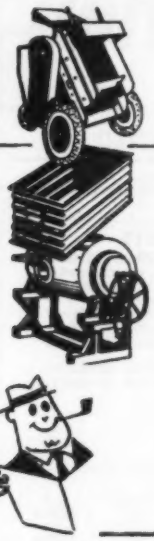
ACME

ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire plant

126 South Clinton Street • Phone: ANdover 3-3430 • Chicago 6, Illinois

MONA



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — CLEVELAND 10, OHIO

CLEANING EQUIPMENT
1—72″ Swingout table
1—96″ Swingout table
3—6 cu. ft. Continuous Tumblast
1—42″ x 48″, 17½ cu. ft. Tumblast with loader
1—36″ x 42″, 11½ cu. ft. Tumblast
1—6′ Table Airblast w/six aux. tables
1—5′ Table Airblast w/six aux. tables
1—6′ Table Pangborn LE

COPE and DRAG UNITS
Automatic Controls
21″ squeeze cylinders
1—215 Milwaukee
1—217 Milwaukee

ELECTRIC FURNACES
1—3000 lb. Hehoult Side Charge
1—500 lb. Lectromelt

MULLERS
Simpsons #1, 1½, 2, 3, unit drive
Clearfield #404, 610
Beardsley-Piper #40, 50

LADLES-WHITING
4—25 Tons 2—15 Tons 2—10 Tons

CORE OVEN
1—Di-Electric Model M800-A Thermonic, 30 KW

SANDSLINGERS
1—B-P 22″ head stationary, R&L arm
1—B-P 19″ head stationary, double belt
1—B-P 19″ stationary, riddle type

ASK FOR OUR COMPLETE LISTING—CALL GLENVILLE 1-1222

Circle 868 on Page 55

...a trademark to remember...a name to trust...

FOUNDRY ENGINEERING SERVICE — HN — FOUNDRY EQUIPMENT BY FOUNDRYMEN

HAMLIN-NAGEL, INC.

Box 192, EDWARDSVILLE, ILLINOIS, *In Metropolitan St. Louis*, PHONE 3864

AIR COMPRESSORS
10, 15, 25, 30, 40, & 100 HP Water cooled, horizontal
175 hp Synchronous, 2 state IR-XRE

AIRLESS BLAST EQUIPMENT

Wheelabrator 48 x 72 with skip and dust collector, excellent condition. American 66″ Swing Table and Collector

27 x 36 Skip and Collector
Wheelabrator 42 x 48 with skip & collector
Wheelabrator 36 x 42 with skip & collector
Pangborn #3 continuous with feeder & collector
Dust Collectors, various sizes
Air Blasting Rooms, complete or component parts

CORE BLOWERS
Demmler 103EO, skip feeder & automatic cycle
Demmler 3EO, feeder & semi-automatic cycle
Demmler #1 and #2, and 2K
Champion CB-8 and CB-15 and CB-18
Redford #1 and 2
San Blo CB-40-D-LPP

Complete CO_2 Unit-Shooter, Gasser, w/Tanks & Mixer

CORE OVENS
Large Porbeck Mold Drying Oven
Porbeck double end Gas or O.I
Porbeck single end Gas or O.I

HEAT TREATING
G.E. 30″ Dia x 36″ Single Phase Electrics

JOLT PIN LIFT
Davenport 34A, 36 x 46 Table
Milwaukee 1536, 32 x 38 Table
Plain Jolters, 72 x 72 Table, Cap. 8500#
Plain Stripper—15,000# Capacity

JOLT SQUEEZE PIN LIFT
International PKL14, 24″ x 24″ Table
International PK18, 24″ x 36″ Table
Milwaukee 125, 21″ x 27″ Table
Milwaukee 126, 21″ x 27″ Table
Milwaukee 145, 24″ x 30″ Table
Milwaukee 193, 19″ x 32″ Table
Osborn 712PJ, 18″ x 26″ Table

SPO 2192 (auto-cycle), 34″ x 42″ Table

JOLT ROLLOVER DRAW
Herman 40″ x 60″—10,000#
International F 16″ Draw, 28″ x 52″ Table
International G 30 x 12, 28″ x 38″ Table
J&J 918, 44″ x 54″ Table
J&J 815, 30″ x 40″ Table
J&J 612, 24″ x 30″ Table
SPO 508, 28″ x 30″ Table
Tabor 30″ x 40″ Table

JOLT SQUEEZE ROLLOVER DRAW
Osborn 332, 20″ x 36″ Table
SPO 920, 20″ sq. cyl, 20″ x 44″ Table
SPO 413D, 24″ x 24″ Table

SPO 9546, 24″ x 30″ Table

JOLT SQUEEZERS
International PJS-16″
International LJS-10″
Milwaukee 103
Osborn 275J and JW
SPO 110J
Tabor Top Squeezers
Champion JS, 10″

MATERIAL HANDLING
Hough HA Payloaders, Forklifts 4000#, 6000#, 7000#, Handling Boxes
Roura Hoppers
1⅛ Yard D.C. Clam Shell
¼ and 1 yard Clamshell Buckets
Hoists, Air and Electric, All Sizes
Crane Magnets 29″, 45″, 50″, 55″

MELTING FERROUS & NONFERROUS

Pittsburgh Moore Electromelt, 3 ton rear charge, 800 and 1500 KVA Transformers

Cupolas #2, 2½, 4, 6, 8, 9, 10
Cupola Blowers, Various Sizes
Cupola Chargers, Skip & Swivel
Foxboro Air Wt. Controllers
Bondactor Mod. 1000
Crucible Furnaces (Stat & Tilt)
Dip Out Reverberatory
Lindberg Induction, 150#

HOT METAL HANDLING
Ladles 250#—20,000#
Pouring Devices, various capacities
Motorized Ladle Carrier
12″ Cleveland Tramrail

MULLERS

Simpson Laboratory Muller
Simpson #3UD complete with skip, auto-cycle, cooling hood, etc.
Simpson #2 open gear with skip
Simpson #1½P Skip, Dust Hood
Simpson #1UD, skip, hood, auto-cycle
Simpson Porto Muller
B&P #60—W or W/O multromatic
B&P #40 with skip and hood
B&P Mulbaro
Clearfield 920 with skip
610 Clearfield

SAND HANDLING & CONDITIONING
Complete Overhead Sand Systems
Screenerator S, M, L
Royer NDP-NC2, Junior
American Sand Cutters, Various Sizes
Bucket Elevators
Troughing Conveyor 16″ x 34′ w or w/o magnetic pulley
Oscillating Conveyor 24″ x 30′
B&P No. 40 and 60 Preparators
Magnetic Pulleys 12 x 18 and 14 x 16
4′ x 6′ A.C. Shakeout
Jeffrey Sanditioners

MISCELLANEOUS EQUIPMENT
Grinders, 18″ x 24″, US No. 65, Marshke, Bridgeport
Flasks, Steel, various sizes
Flasks, Aluminum Slip
Flasks, Fremont Magnesium Slip
Jackets, Aluminum & Wopper Jaw
Core Plates—Aluminum & Transite
American Core Rod Straightener
15 HP Swing Grinder
Tumbling Barrels 36″ x 72″, Whiting, Sly
458 Chain & Trolleys
42″ Bullard "New Era" VTL lathe with side head
52″ Betts Boring Mill with two loading arms, late
American Radial Drill 14″ x 7′ arm
Cincinnati 2F Milling Machine, late

Send your requirements; our stock changes daily. WANTED! Good Surplus Equipment

Circle 869 on Page 55

DEPENDABLE SERVICE
QUALITY EQUIPMENT
GUARANTEED SAVINGS

PARTIAL LISTING OF EQUIPMENT NOW AVAILABLE — INQUIRIES INVITED

CUPOLA BLOWERS

INGERSOLL RAND

MODEL	C F M	PRESSURE	HP
FS-337	3000	20 oz.	25
FS-365	4500	16 oz.	30
FS-355	6000	16 oz.	40
FS-387	10,200	20 oz.	75
FS-377	10,500	20 oz.	85
FS-565	14,100	40 oz.	200
ROOTS CONNERSVILLE			
RCR	1040	20 oz.	10
RCS	9075	32 oz.	100
SPENCER TURBO			
2025H	1850	32 oz.	25
Cont.	7500	48 oz.	150

PANGBORN LK-6' Dia Table-Room Rotoblast. Max. height of work 36". max. weight on table 5000#. Table speed 2.4 RPM. Pitless type. New 1952. Serial #6LK-5110.

SAND MULLERS

CLEARFIELD

MODEL	PAN DIA.	CAPACITY
404	4'	400#
610	6'	1500#

BEARDSLEY & PIPER

MODEL	CAPACITY	AIR COOLED
30	4 cu. ft.	Yes
30	4 cu. ft.	No
60	12 cu. ft.	Yes
60	12 cu. ft.	No
70	15 cu. ft.	No
80	20 cu. ft.	Yes

ALL CAN BE EQUIPPED WITH DUST HOODS, SKIP HOIST LOADERS, MULTRAMATIC CONTROLS, ETC.

2—B&P #3½ Mulbarcs.
1—SIMPSON Porto-Muller.

SIMPSON

MODEL	PAN. DIA.	CAPACITY	DRIVE
0	3'	175#	Sep.
1-H	4'	500#	UD
1½	4'-6"	700#	UD
2	6'	1500#	UD
2	6'	1500#	Encld.
3	8'	3000#	UD
3	8'	3000#	Encld.
3½	9'-3"	5000#	UD

ALL CAN BE EQUIPPED WITH NATL. ENG. STRAIGHT LIFT SKIP HOIST BUCKET LOADERS.

LANCASTER

MODEL	PAN. DIA.	CAPACITY
EA4	59"	9 cu. ft.
EBG-4	59"	9 cu. ft.

JOLT SQUEEZE PIN LIFT MACHINES

MODEL	TABLE SIZE	DRAW	DIA.	CAP.
FKL-12	18" x 24"	5¼"	12"	600#
FKL-14	20" x 28"	5¼"	14"	1000#
FK-16	20" x 30"	8"	16"	1700#
MILWAUKEE				
125	21" x 27"	8"	12"	1200#
145	24" x 30"	8"	14"	1700#
195	28" x 39"	10"	19"	3000#
196	16¾" x 39"	10"	19"	3000#
244	22" x 32"	12"	24"	3000#
245	35¼" x 42"	12"	24"	5900#
246	23¼" x 42"	12"	24"	5900#
OSBORN				
710-PJ	16" x 25"	6"	10"	500#
712-PJ	18" x 28"	6"	12"	750#
714-PJ	20" x 31"	7"	14"	1000#
716-PJ	22" x 34"	7"	16"	1250#
SPO				
2114-P	20" x 27"	4"	11"	600#
2136	21" x 30"	6"	13"	800#
2146	23" x 31"	6"	14"	1000#

JOLT SQUEEZE ROLLOVER DRAW

MILWAUKEE

MODEL	TABLE SIZE	DRAW	CYL.	CAP.
167	32" x 33"	12"	16"	1000#
OSBORN				
332	26" x 36"	9"	16"	750#
333	32" x 45"	11"	19"	1400#
SPO				
413-C	24" x 25"	10"	13"	600#
917-A	26" x 36"	9"	17"	750#

WHITING 10-TON HYDRO-ARC FURNACE

10' dia. shell, 6'-8" inside depth, 1" steel plate. Cradle tilt, manual & motorized, 9" dia. electrodes. Capacity—18 to 23 tons cupola malleable iron per hour. Holding capacity—16 tons normal, max. 21 tons.
1—ALLIS CHALMERS 2000 KVA Furnace Transformer. 12,000 volt primary, OIWC motor operated tap changer. Entire unit new 1952.

OSCILLATING CONVEYORS

AJAX ENGINEERING (Lo-Veyor)

MODEL	SIZE	CAPACITY in T P H
LC 18-6-24	18" W x 24' L	50
LC 24-6-7	24" W x 7' L	70
LC 24-6-21 FA	24" W x 21' L	70
LC 36-6-9DA	36" W x 9' L	100
LC 36-6-14 DA	36" W x 14' L	100
HEWITT-ROBINS		
VC-6	24" W x 120' L	55
VF-3	30" W x 5' L	12
LINK BELT		
Flexmount	8" W x 70' L	15
SIMPLICITY ENGINEERING		
OA-10-JA	24" W x 13' L	150
OA-10-JA	24" W x 11' L	150
OA-10-JA-2	30" W x 7' L	150
OA-10-JA	30" W x 13' L	100
OA-10-JA	36" W x 6' L	150
OA-10-A	36" W x 10' L	200
OA-10-A	36" W x 16' L	200
OA-10-A	36" W x 25' L	600

SANDSLINGERS

B&P Stationary, Model "DB," 5' jib arm, 4' ram, 19" head, 5" cup, 2-speed, 20/13 HP. Raising & lowering arms or fixed.
B&P Stationary, Model "DB," 8' jib arm, 4' ram, 19" head, 4" tip, 20/16 HP. Raising & lowering arms or fixed.
B&P "Motive Jr.," 11' jib arm, 4' ram, 16" head, 4" cup, R & L arms. 2-speed, 20/13 HP.
B&P "Motive," 15' jib arm, 9' ram, 2-speed, 25/16 HP. With Raising & Lowering

HANDY SANDYS

NEWAYGO SHS-4-G Super Handy Sandys, Single Hopper, 15 cu. ft. capacity, 4' receiving hopper, air gates, 21' center elevator.
NEWAYGO SHS4-GT Super Handy Sandy, Twin Hopper, 25 cu. ft. capacity, 4' receiving hopper, 21' center elevator.
NATIONAL ENGINEERING Moulders Helper, Twin Hopper, 3000# capacity, each air operated gates.

JOLT PIN LIFT MACHINES

DAVENPORT

MODEL	TABLE SIZE	DRAW	CAP.
34 A-JS	36" x 46"	12"	2500#
INTERNATIONAL			
JDP 1200x8	24" x 26"	8"	1200#
JDP 3000x10	48" x 48"	10"	3000#
JL	32" x 52"	12"	2000#
JOHNSTON & JENNINGS			
68-SP	25" x 30"	8"	600#
812-S	30" x 38"	12"	1600#
MILWAUKEE			
1030	28" x 34"	8"	1000#
1536	32" x 38"	10"	1500#
2036	32" x 38"	10"	2000#
2542	38" x 42"	12"	3000#
3548-6	44" x 46"	12"	3500#
OSBORN			
540	32" x 52"	12"	2000#
560	32" x 45"	12"	2500#
SPO			
3070	26" x 35"	10"	1500#

JOLT ROLLOVER PATTERN DRAW

DAVENPORT

MODEL	TABLE SIZE	DRAW	CAP.
24 SA	24" x 35"	12"	1000#
28 SA	28" x 40"	12"	1500#
34 A	34" x 58"	15"	2500#
48 A	48" x 82"	24"	6000#

1—INTERNATIONAL Model "AN," Air Clamp, Air Turnover, Air Draw-Molding Machine, 4500# capacity. Flask—40" width by open ends. Draw 20". New 1952. Used six months.

JOHNSTON & JENNINGS			
612	24" x 30"	12"	600#
815	30" x 40"	15"	1200#
918	44" x 54"	20"	2000#
920-RC	44" x 54"	20"	2000#
1020-RC	50" x 60"	20"	3000#
OSBORN			
242-W	29" x 42"	12" to 19"	1500#
244	35" x 52"	16" to 25"	3000#
405	57" x 64"	26"	3000#
442	21" x 31"	10"	600#
601	24" x 30"	10"	900#
602	30" x 36"	12"	1200#
643	35" x 50"	20"	2000#
SPO			
505	18" x 23"	6¼"	400#
506	24" x 25"	10"	600#
TABOR			
MODEL	TABLE SIZE	DRAW	CAP.
22"	22" x 32"	10"	600#
22"	22" x 42"	10"	600#
30"	30" x 40"	12"	1000#
40"	40" x 60"	15"	3000#

"Built on a Foundation of Mutual Trust"

a MACHINERY AND EQUIPMENT COMPANY

10900 CEDAR ROAD • CLEVELAND 6, OHIO • SW 1-3900

Circle 870 on Page 55

universal MACHINERY AND EQUIPMENT CO.

. . . large enough to serve you, small enough to know you.

1630 North Ninth Street
Reading, Pa., Franklin 3-5103

• AIR COMPRESSORS
75 hp INGERSOLL-RAND water cooled, horizontal
100 hp WORTHINGTON air cooled, 2 stage

• BLOWERS
CENTRIFUGAL 16 oz. 2 to 5 HP
GE, WILBRAHAM—GREEN FISHER Positive Pressure & Cent., Cupola Blowers

• BLAST CLEANING EQUIPMENT
15" Cont. WHEELABRATOR Tumblast
26" Cont. WHEELABRATOR Tumblast
20" x 27" WHEELABRATOR Tumblast
27" x 36" WHEELABRATOR Tumblast
36" x 42" WHEELABRATOR Tumblast
48" x 42" WHEELABRATOR Tumblast
48" x 48" WHEELABRATOR Tumblast
96" WHEELABRATOR Swing Table
1-A WHEELABRATOR Multi-table
WHEELABRATOR Peening Cabinet
WHEELABRATOR "K" Cabinet
PANGBORN 5' LF Table
PANGBORN Air Blast Room 5' x 8'
WHEELABRATOR Pipe Cabinet
WHEELABRATOR Sheet Cleaning Machine, 48" wide stock
15" x 20" WHEELABRATOR Tumblast
6' LK PANGBORN Table Room
6' LG PANGBORN Table
9' LG PANGBORN Table
No. 2 WHEELABRATOR Multi-table
DUST COLLECTORS AND SKIP LOADERS AVAILABLE FOR ALL MACHINES

Just received from Gov't. storage 48" x 42" & 27" x 36" WHEELABRATORS with skip loaders & dust collectors
LIKE NEW . . . ACT QUICKLY

• CONVEYORS
HEWITT-ROBINS Oscillating, 18" W x 40' L
HEWITT-ROBINS Vibrating, 18" W x 10' L, Model VC-1
LINK-BELT, Car type mold, 114 cars, 403' track, car size 18" x 42"
SIMPLICITY 24" x 10" Feeder w/hopper, Model OA-10-JA2
CARRIER Oscillating, 18" W x 54' L
LINK-BELT Oscillating, 18" W x 13' L
SIMPLICITY 17" W x 11' L, Model OA-10-KA Feeder

• CORE BLOWERS
DEMMLER #1, #2, #2A, #3K, #4E
INTERNATIONAL 8B-13
OSBORN #91, #192, #91-10
RANDALL MODEL "A" Bench Type
SAN-BLO #40-P-1, 40# core
TACCONE #4D, 10" Draw Stroke Cyl.

• DUST COLLECTORS
COMPLETE STOCK—both Bag & Wet Types, 1000 to 15000 CFM

• FURNACES
DIRECT ARC MELTING
250 lb. LECTROMELT, Side Charge
500 lb. LECTROMELT, 200 KVA trans.
1000 lb. SWINDELL
2000 lb. HEROULT
2000 lb. SWINDELL, 3/60 1000 KVA
1½ Ton HEROULT
10' Top Charge Furnace
INDIRECT ARC MELTING
10# DETROIT
350# DETROIT LFA
750# DETROIT LFY, Conical Shell
1000# DETROIT AA
3000# DETROIT C, 500 KVA
INDUCTION MELTING & HEATING
30 KW, ECCO Hi-freq. Vacuum Melting
35 KVA, AJAX 60 cy., alum.
35 KVA, AJAX Spark Gap, High Freq. steel
30 KW LEPEL, water cooled spark gap
75 KW TOCCO
GAS & OIL FIRED
1000# HAUSFELD Hand Tilt, Oil fired, alum or magnesium
1—#900 JC STROMAN, gas, Like new
6000# STROMAN, gas fired
20 Gas & Oil Fired Furnaces
HEAT TREATING
4' x 4' x 10' Gas Fired Annealing
9' x 12' Car Type, gas/oil
210 KW LINDBERG conveyor box type
7' Rotary G.E. 200 KW, 1950° F
36" x 36" WESTINGHOUSE Pit Type
10" x 12" x 24" LINDBERG, 2500° F. Hydrogen
42" x 96" Pit Type Gas
42" x 73' Roller Hearth
36 x 72, 48 x 120, 48 x 144 gas fired
Large Stock Gas Fired Box Heat Treating Furnaces
BOX TYPE ANNEALING
42 x 96, 42 x 120 recirculating gas fired

• GRINDERS
DOUBLE END
3 Hp HISEY WOLF 3/60/220
5 Hp U.S. Model 64, 3/60/220
7½ Hp U.S. Model 66, 3/60/440
10 Hp STANDARD 3/60/440
15Hp MARSCHKE 220 volt
25 Hp KLING 3" dia. shaft
PEDESTAL
3 Hp CLEVELAND 3/60/440
5 Hp CINCINNATI 2/60/440
15 Hp Model Class 1, 3/60/220-440
SWING FRAME
7½ Hp MUMMERT-DIXON 2/60/220-440
10 Hp SAFETY 24" x 3" wheel
15 Hp MARSCHKE 3/60/220-440
15 Hp MUMMERT—DIXON

• LADLES
BOTTOM POUR
MODERN, 49" x 49"
MODERN Crane Type, 55" H x 50" top
MODERN Crane Type, 60" H x 60" top
LIP POUR
WHITING 52" x 52" top dia. geared
CYLINDRICAL
WHITING, 26" L x 2?" dia, 1100# iron
WHITING, 19" L x 22" dia, 600# iron
WHITING, 38" L x 28" dia, 2200# iron

• MATERIALS HANDLING
BYERS Mobile Crane. BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
HOUGH PAYLOADER, Model HA, 1000# cap., hyd. lift, mech. dump

• MOLDING MACHINES
JOLT ROLLOVER PATTERN DRAW
DAVENPORT #348A w/air clamps, 34" x 48" table, 2500#
DAVENPORT #40SA, 40" x 60" table, 3000#
HERMAN 10,000# 48" x 109" table
HERMAN 6000#, 42" x 78"
HERMAN 7500#, 40" x 50" table
HERMAN 3000#, 30" x 66" table
HERMAN 3000#, 32" x 70", 15" cyl. series charging conveyor type
HERMAN 1500# to 30" x 48" tables
INTERNATIONAL 31" x 16", Type F, 28" x 34" table
INTERNATIONAL 30" x 12", Type G, 28" x 35" table
INTERNATIONAL 13" x 17" table
J & J #918, 40" x 48" table, 18" draw
J & J #815 RR, 30" x 40" table, 15" draw
J & J #612RP, 24" x 30" table, 12" draw
OSBORN #602, 36" x 26", 900#
OSBORN #405, 3000#, flask 64" x 57"
TABOR 40" x 60", 1500 & 3000#
TABOR 30" x 40" w/air clamps, 1000#
TABOR 22" x 42" pattern draw shockless, portable 600#
TABOR 20" x 30", w/air clamps, 1000#
TABOR 14" x 16" Rockover 150#
TABOR 40" x 50" table, 3000# capacity
PLAIN JOLT
INTERNATIONAL, 3' x 4' Table, 12" cylinder
TABOR 3' x 4' table
JOLT PIN LIFT
HERMAN #4317, 22" x 30" table
INTERNATIONAL, JDP, 1200 x 8", 24" x 26" table, 8" draw, 1200# port.
SPO #305, 750 lb. 20" x 27" table
TABOR 20" x 24" table, 600#
JOLT SQUEEZE PIN LIFT
INTERNATIONAL PKL, 20" x 28" table, 14" sq. 5¼" draw
INTERNATIONAL PKL, 18" x 24" table, 12" sq., 5¼" draw, stat.
MILWAUKEE #163, 15" x 24" table, 11" sq., 1500#
MILWAUKEE #165, 24" x 30" table, 16" sq., 1700#
NICHOLLS 18-44, 6¼" draw.
OSBORN, #712J, #712PJ, 18" x 28" table, 12" sq., 6" draw, stat. & port.
OSBORN #716 PJ, 22" x 34" table 16" sq., 8" draw
SPO #2114P, 21" x 27" table, 600#
SPO #2116, 21" x 27" table, 11" sq., 6" draw
JOLT SQUEEZERS
INTERNATIONAL #12 LJS, 16" x 20"
INTERNATIONAL #10 LJS, 16" x 20"
OSBORN #275J, 16 x 20" table, 400#
TABOR Squeeze-in Head, 16" x 19" table
TABOR Yoke Type, 18" x 26" table

SIMPSON No. 3 MULLER Unit Drive 8' dia., 20 to 25 cu. ft. batch

• MULLERS AND MIXERS
B&P #30 Speedmuller w/skip, 3 cu. ft.
B&P #40 Speedmuller w/skip, 5 cu. ft.
B&P #50 Speedmuller with cooling & multro-matic controls, 7½ cu. ft.
B&P Conventional, SIMPSON type, 87½" Dia., arranged for cooling
SIMPSON, #0, U.D. 3' Dia.
SIMPSON, #1, U.D., 4' dia., 4 cu. ft.
SIMPSON #1½, U.D., 4'6" dia., 6 cu. ft.
SIMPSON #1½, Sep. Dr., 4'6" dia., 6 cu. ft.
SIMPSON #2, enc. gear or open gear, 6' dia., 14 cu. ft.
SIMPSON #3, 8' Dia. Sep. Dr., or U.D. 30 cu. ft. batch

• OVENS
COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22' x 12' x 10'
GENRICH, Elec. elevator type

• PRESSES
40 Ton FERRACUTE Sprue Cutter 1½" stroke
125 ton R.D. WOOD Down acting, 9" stroke
NIAGARA No. 82 Punch Press

• SAND CONDITIONING
HANDY SANDY Units, Model HS7GT
READY SANDY Unit
B&P Nite-Gang
B&P Screenarator, Model "M"
LINK-BELT Revivifier
MOULDER'S FRIEND, 50" cutting reel
ROYER, NC-2, 10-15 tons/hr, 1½ Hp
ROYER, NC-4, 10-15 tons/hr, 1½ Hp
ROYER PREPARATOR, Comb., Model NDC, 25 ton/hr scrap removal, 8' x 8' hopper
ROYERS, NDP, 15-25 tons/hr, 2 Hp

NATIONAL ENGINEERING Sand Handling Unit, complete. LIKE NEW . . . LOW PRICE

• SAND SLINGERS
B&P Stationary, 2 speed, 19" head, 4" tip with plate feeder
B&P Stationary, Single Speed
B&P Tractor Type, 16" Head
B&P Tractor Type 19" Head

• SHAKEOUTS
2' x 10' HEWITT-ROBINS
3' x 10' SIMPLICITY
4' x 5' SIMPLICITY
4' x 5'6" SIMPLICITY
4' x 6'6" SIMPLICITY
4' x 8' SIMPLICITY
5' x 6' HEWITT-ROBINS
5' x 8' HEWITT-ROBINS

• TESTING MACHINES
100,000 lb. Olsen UNIVERSAL Tensile
3000 Kg Gogan Brinell Testers

• TRANSFORMERS (Furnace)
100 KVA KUHLMAN 13 200, 1/60
250 KVA WESTINGHOUSE 6600, 3/60
300 KVA WAGNER 4600, 1/60
500 KVA KUHLMAN 13,200, 1/60
800 KVA PENNA. 23,000, 3/60
1000 KVA WESTINGHOUSE 23,000, 3/60
1000 KVA G E. 13,200, 3/60
2000 KVA WESTINGHOUSE 13,200, 3/60
5000 KVA WESTINGHOUSE 2300, 3/60
7500 KVA PENNA. 13,200, 3/60

• TUMBLING BARRELS
SLY 68" x 32" round
SLY 48" x 36" round

• MISCELLANEOUS
BLASTCRETE Model PM-1 Cupola Gun
KANE & ROACH WIRE STRAIGHTENER Model DX-5
FLASKS, CORE PLATES, All Sizes
CLIMAX Model 2-A Wire Straightener
62" Magnet
MOULDER'S Hoppers, Various Sizes

Your *LARGEST* Foundry Equipment Dealer

Over 60 years
Service to Industry

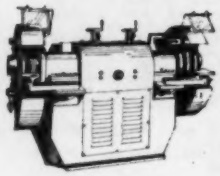
GRINDERS

EASIER, FASTER, MORE ECONOMICAL FOR ALL GRINDING OPERATIONS.

Swing Frame Grinder

Portable 1/3 to 7½ hp

America's Greatest and Most Complete Line



Dual Motor Vari-Speed Grinder

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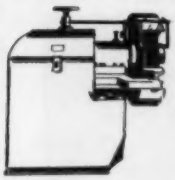

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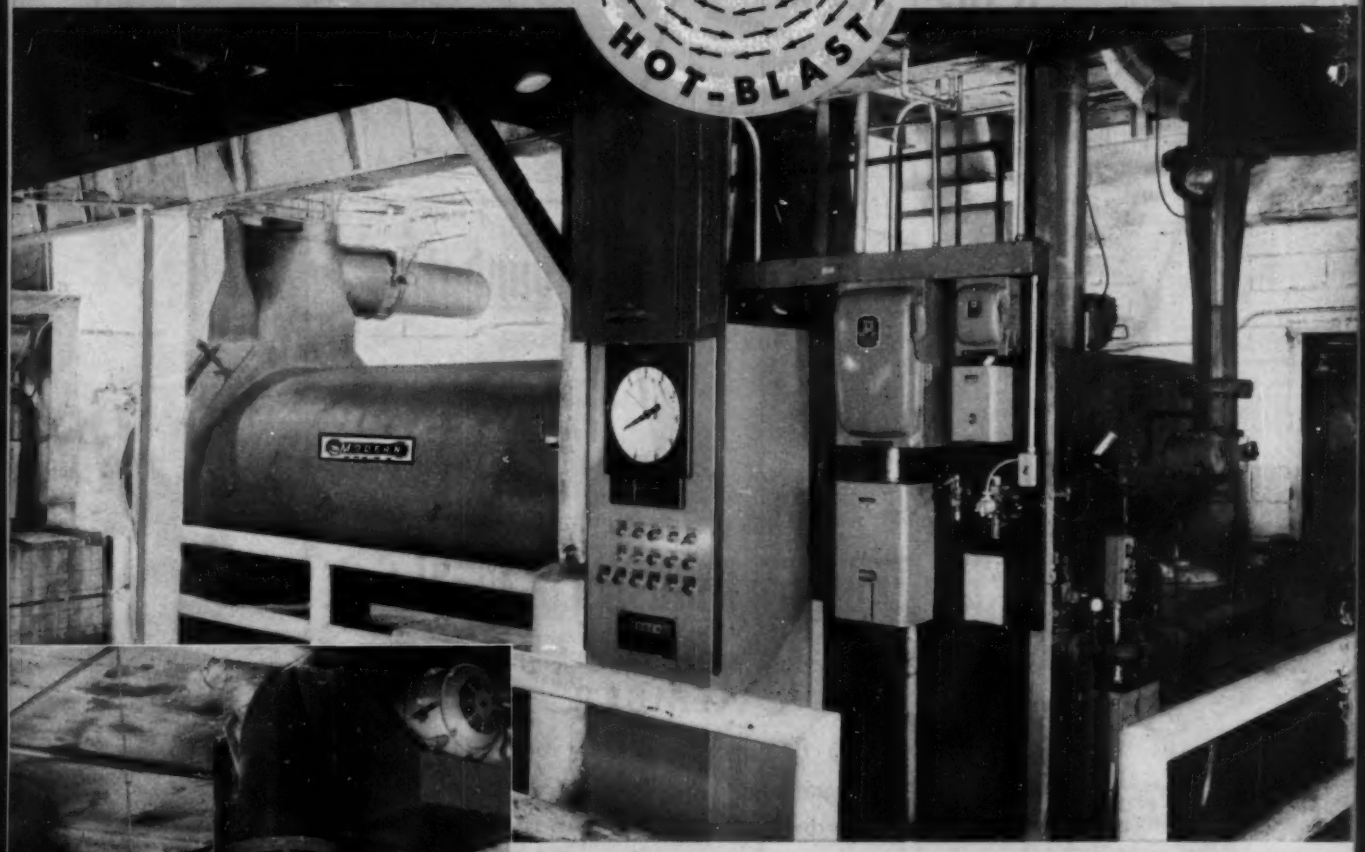

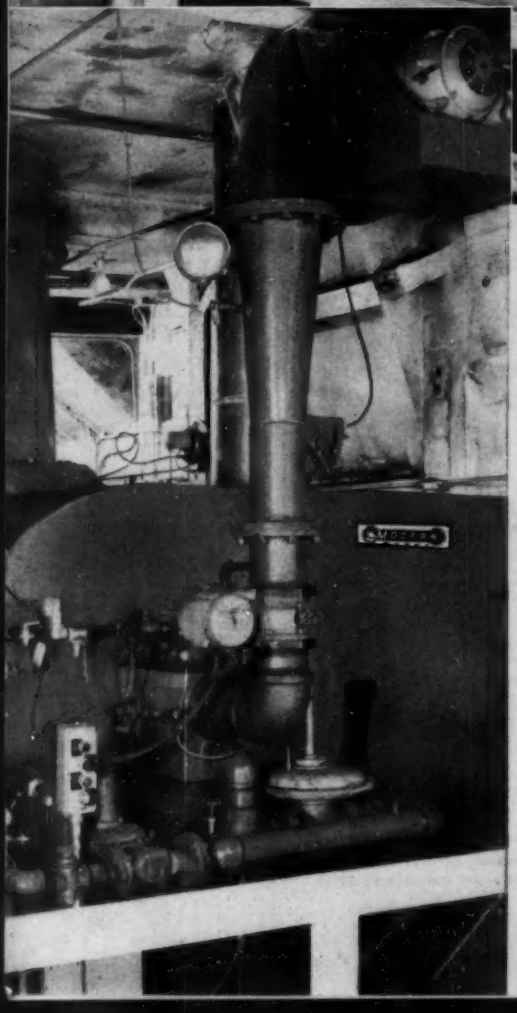

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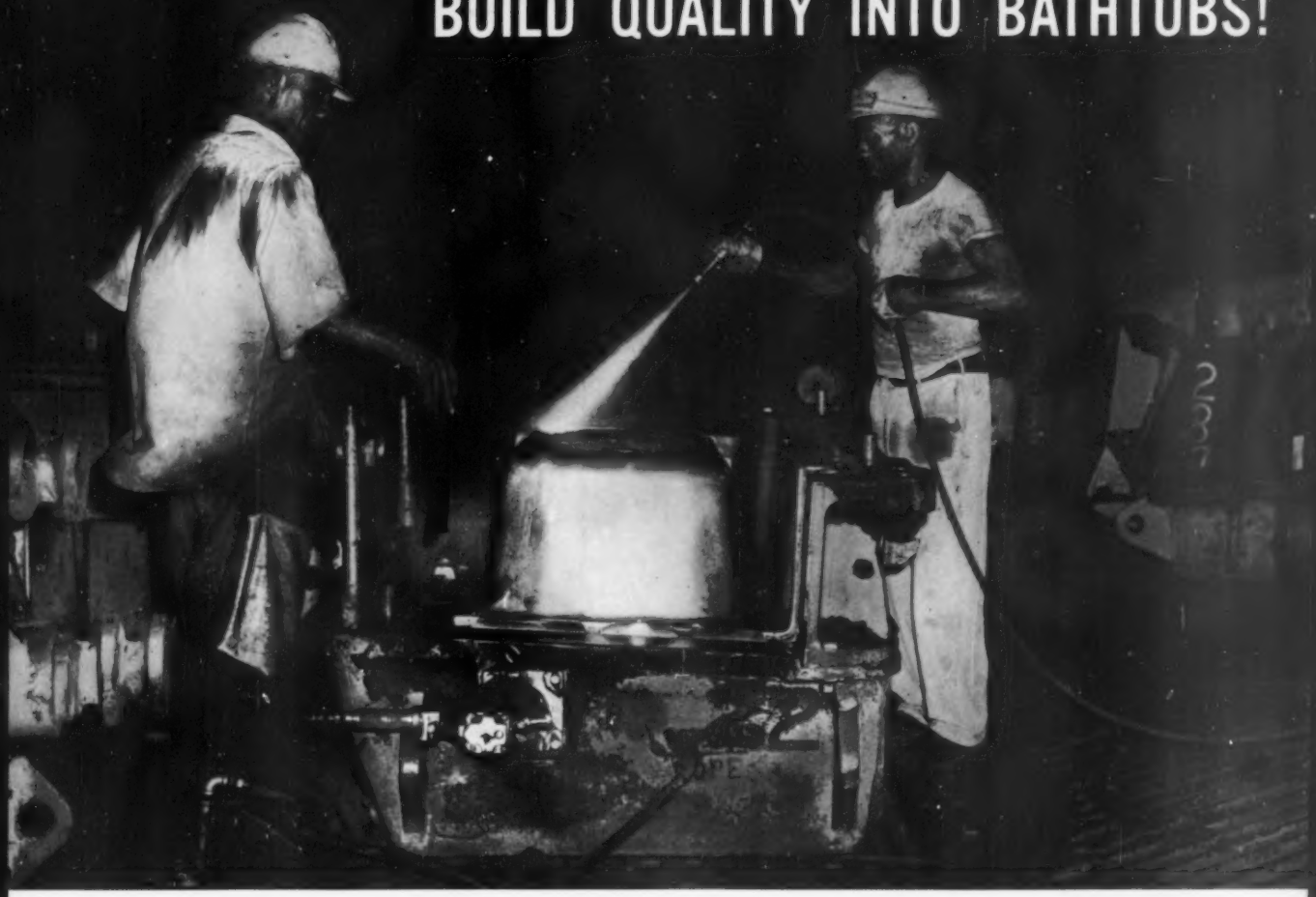

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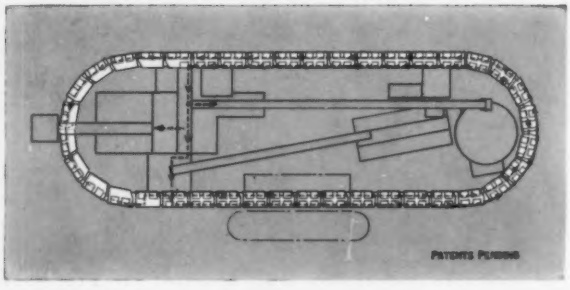

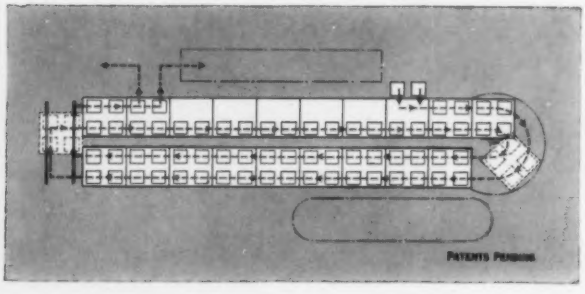

"Double MRI" Mold Handling System

Rectangular loop, consisting of two straight runs connected with a rotary turn and transfer car. Cars advance one car length, then remain stationary for timed period so large molds can be loaded onto the conveyor, poured, and the molds removed, while the conveyor is stationary. Molds are carried side by side on the cars and make almost two complete trips around the loop, thus nearly doubling the cooling time per square foot of floor space.

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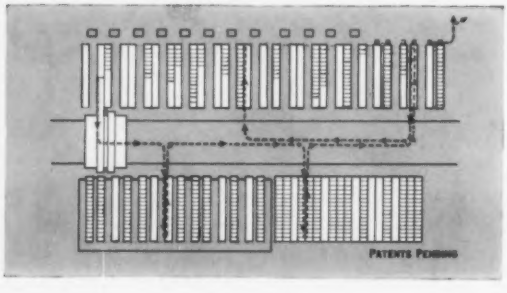

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